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LECTURES

ON

PATHOLOGICAL ANATOMY,

DELIVERED AT

GUY'S HOSPITAL

DURING THE

SUMMER SESSIONS OF 1857, 1858.

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BY

SAMUEL WILKS, M.D. LOND.

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PREFACE.

HAVING been repeatedly solicited by the Students of Guy's Hospital to publish some Lectures which I delivered during the summers of 1857-58, on Pathological Anatomy, I have at length complied with their request, and now offer this book to their notice.

My original design, however, extended no further than to the publication, in the form of a syllabus, of some pathological tables, accompanied by references to certain typical preparations contained in our Museum; but, finding that further explanation appeared necessary, I was induced to send to the press the whole of my lectures, in the exact form in which they were originally delivered. This circumstance will account for any peculiarity which may be observed in their style and arrangement.

The order in which the subjects are treated is not one which I should have chosen, but, since it is that adopted in our Museum, I found it convenient to adhere to it. The allusions to preparations have, of course, been mainly designed for the convenience of those Students and others who have access to our Museum; but they will not, I hope, be found to render the descriptions given in the text less intelligible to other readers.

The attempt to demonstrate the morbid anatomy of the whole body, in the few hours set apart in the summer session for a voluntary course, may require some explanation. It has always been my opinion, that every complete course of medical education should comprehend a systematic elucidation of the various morbid changes to which the human frame is subject, independently of the regular courses of lectures on medicine and surgery, and as a supplement to them; for, although it has been rightly considered by the Examining Boards that the subject is included in these courses, since pathology is the basis of all true instruction in practical medicine, yet the subject is of sufficient importance to justify separate treatment. Moreover, it is well known that many experienced professors would gladly leave the demonstration of the structural changes of organs, in order to devote a larger portion of their time to the more practical matters relating to the symptoms and treatment of disease. This has always been felt at Guy's, and therefore, ever since that institution has possessed a medical school, it has been the practice of some of its most eminent teachers to deliver a course of lectures on pathology. The several licensing boards have recently shown their sense of the importance of the subject, by instituting special examinations in this department; and it would be well, I think, if they insisted on its more systematic treatment by those in our hospitals who are qualified to undertake the task. Such teachers would then occupy a position in England analogous to that which in the Continental Universities is filled by some of their most distinguished professors.

To this statement, as to the purpose of these lectures, and my reasons for publishing them, I venture to add a word or two respecting my own personal pretensions. I do this with some reluctance, and solely for the satisfaction of any strangers into whose hands this book may fall; but it seems right to say, as a mere matter of fact, that I have for the last fifteen years made a daily study of the dissection of the dead, that I have now for many years held the appointment of Demonstrator of Morbid Anatomy, and that I have myself recorded between 2000 and 3000 inspections, of which we have an average at Guy's Hospital of more than 250 annually. I have also the charge of a splendid pathological collection. In the preparation of these lectures, I have sought to avail myself of the advantages afforded by so ample and varied a field of investigation, and have carefully abstained from making any statement unverified by my own observation and experience.

St. Thomas Street, Southwark,
June, 1859.

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PART I.

DISEASES AND INJURIES OF BONE.

MALFORMATION	Excess of development.	
	Deficiency of development.	
HYPERTROPHY	General	External, or bulk increased.
		Internal, or more dense.
		The two combined.
	Local	Exostosis.
		Osteophyte.
ATROPHY	From disease.	
	From old age.	
	From pressure.	
OSTEOPOROSIS, or spongy hypertrophy.		
INFLAMMATION	Periostitis	Local or constitutional; as simple, scrofulous, syphilitic, &c.
	Ostitis	Ditto.
	Caries	Ditto.
	Necrosis	Ditto.
INJURY	Fracture.	
	Loss of substance, skull, &c.	
	False joint.	
RICKETS.		
MOLLITIES OSSIUM.		
ALTERATIONS IN FORM OF	Head	Hydrocephalus, &c.
	Spine	Angular and lateral curvature, &c.
	Thorax	in curved spine, rickets, emphysema, &c.
	Pelvis	in rickets, mollities ossium; oblique, &c.

- ADVENTITIOUS GROWTHS
  - Malignant
    - Carcinoma; scirrhous, and encephaloid.
    - Osteoid cancer.
    - Osteolyosis.
  - Semi-malignant
    - Osteosarcoma, varying proportions of fibre, bone, and cartilage.
  - Generally local and innocent
    - Fibrous tumors.
    - Osseous tumors.
    - Enchondromatous tumors.
    - Myeloid.
    - Epithelioma.
- TUBERCLE.
- HYDATID.
- BLOOD TUMORS
  - Cysts.
  - Osteoaneurism.
  - Cephalhæmatoma.
  - Scorbutic.

MALFORMATION.

Excess of Development.—Examples of this are seen in these *supernumerary vertebræ* which show thirteen dorsal[1] with the same number of ribs and these six lumbar:[2] in some cases it is difficult to say whether the extra vertebra is a lumbar or an additional sacral piece. Thus in this specimen[3] it appears as if an extra piece was added to the upper part of the sacrum when looked at in front, but from behind the arches and spine are seen to be distinct, like those of a vertebra. *Supernumerary ribs* are short processes seen in the neck and loins, and called cervical and lumbar ribs.[4] I may here also show you this specimen of *episternal bones*,[5] where two small tubercles are seen growing on the upper edge of the sternum; they are thought to correspond to the coracoid bones of birds: also this humerus exhibiting a *supra-condyloid process*,[6] which formerly was catalogued as an exostosis. This process, which is situated about two inches above the inner condyle, forms a hook, and, when a ligament is attached to its extremity and the condyle below, a hole or ring corresponding to the supra-condyloid foramen met with in the humerus of the carnivora and some other classes of animals, for the purpose of transmission of the median nerve and brachial artery. You will find many specimens of *supernumerary fingers and toes* on our shelves.

---

[1] 1000^{50}. [2] 1006^{60}. [3] 1027. [4] 1045 and 1045^{70}. [5] 1038^{20}. [6] 1100^{15}.

Deficiency in Development.—A remarkable form of this is seen in the *anencephalous* fœtuses, of which we have numerous examples, and in which, together with an absent brain, the bones of the cranium are scarcely developed. There may also be a deficiency in parts of the skull, as in this preparation, exhibiting a portion of parietal bone wanting; but the most interesting of the kind is exemplified in this specimen,[1] where there is an opening in the ocipital bone, and a portion of brain, or its membranes protrude, constituting an *encephalocele*. A still more common deficiency is a want of union of the posterior arches of the vertebræ, constituting *spina bifida*. In many of our specimens you will see it coexisting with anencephalus, and in some with hydrocephalus. Some, too, show an open canal the whole length of the spine, while others exhibit merely a deficiency in a particular locality. This is generally in the loins, where we find the posterior arches of two or three vertebræ wanting, and the membranes protruding in a sac. This is usually about the size of an orange, and consists of the spinal membranes filled with fluid protruding externally through the open canal; its inner surface is formed by the visceral arachnoid, or that which immediately covers the cord, and, therefore, the fluid within it is subarachnoid, and communicates directly with the fluids in the ventricles of the brain. This arachnoid is closely adherent to the serous surface of dura mater, and latter to integument, so that it is difficult to separate the structures forming the wall of the sac. The medulla, or cauda equina, at the spot where the bones are deficient, may continue its way downwards as usual; or if the opening be large the nerves may pass into the sac, and be distributed upon its walls.

Want of union simply, is sometimes met with, as in this specimen of atlas,[2] where the two halves are perfect, but are not united, though probably in the fresh subject they were joined by ligamentous tissue. Sometimes one half of the arch of a vertebra is not developed, and thus the spine falls on that side, and a distortion results. The specimen,[3] which I hold in my hand, is a very interesting and remarkable example of this. You will see that the

[1] 1055, and several under "Brain," as 1563^{55}. [2] 1000^{80}. [3] 1004^{92}.

spine is distorted from a fusion of three dorsal vertebræ, arising apparently, from this want of regular development; and in the neck you will also see that the arches of one vertebra are not united, but that one half is ankylosed to the arch of the vertebra above, while the other half remains single, and alone gives origin to the spinous process. The spinous process too may be sometimes *bifid*. An *absence of bone* is met with in deformed limbs,[1] or in cases of deficient fingers and toes, and deficient ribs.[2]

Amongst other abnormities might be mentioned *bifid* ensiform cartilage, and which sometimes produces a foramen in the end of the bone, bifid ribs, bifid odontoid process of axis. *Ossa triquetra* will be hereafter mentioned.

HYPERTROPHY.

There is great difficulty in defining this term as a simple process, since a similar condition is produced by an inflammation, under which head many cases of enlargement of the bone might be included. The same difficulty can scarcely exist with any other structure, since the products of inflammation and a simple increase by growth are altogether different, the former assuming only the characters of the lowest tissues, while the other partakes of the structure of the organ enlarged. For instance, an increased bulk of the spleen, heart, &c., would be due to hypertrophy, whereas a simple inflammatory process in these organs would produce only a fibrous tissue. In the case of bone, however, which ranks amongst the simpler tissues, the case is different; for here the inflammatory products change into osseous material, as in a simple growth or hypertrophy, and, therefore, by merely inspecting an enlarged bone it is difficult to say whether the increase is due to a process resembling inflammation in other parts, or whether it more resembles those slow enlargements of the organs, which are called hypertrophies. In many instances the history will throw some light upon its nature, and often there are other inflammatory processes present, such as caries, which may determine the point. In the absence, however, of all such appearances, we must take the condition as we find it, and adopt the term hypertrophy. The difficulty may sometimes be avoided by using the term *chronic* inflammation; a term, however,

[1] 1306^{56}. [2] 1044.

which I much dislike, since often there is not one of the recognized signs of inflammation present. The same remark I shall have to make as we proceed with reference to many other so-called chronic inflammations; and I might here inform you that many of the distinctions made in these tables are to a certain extent arbitrary, and for the sake of impressing the various forms of disease on your memory. It is convenient to speak of hypertrophy as *general* and *local,* the latter including exostoses. And to begin with the first, in any individual bone which may be hypertrophied we may find either an increase to the surface whereby it is enlarged, or the hypertrophy may be due to a fresh deposit of bone within the tissue itself, giving it an increased density and weight; or, thirdly, the two conditions may be combined. In some cases the enlargement is due to an addition of new material to the surface; and when this is intimately connected with the original wall of the bone, and no distinct line can be seen between, we say the bone is hypertrophied, rather than that periostitis has existed; but in many cases of increased density of bone without enlargement it is highly probable that an inflammatory process has been the cause, although it is difficult to prove. In this cranium, for example, femur and tibia, the bones are much enlarged, but the structure is healthy, and the periosteum covers them naturally. When, as in this instance, the whole skeleton is affected, the cause of the disease is, no doubt, constitutional, and arising from scrofula or syphilis; whereas if one bone or a part of a bone be alone affected, the cause may be local. In one of these specimens, where all the bones were enlarged, there was a distinct history of rickets,[1] and, therefore, we might consider that in the first place there was a swelling of the structure by a widening of the lamellæ and cells, and that afterwards a bony material took the place of the gelatinous matter, and the structure, thus indurated, became permanently enlarged. Remarkable examples of hypertrophy are frequently met with in the removal of the calvaria,[2] where the bone is found often double its usual thickness; the increase may be uniform, but very frequently it is greater in some parts than others, as for example in this specimen, where the frontal bone is immensely thickened on each side, while in this other one, with a corresponding hypertrophy, there is an atrophy, or thinning, on each side of the sagittal suture. You see it would be gratuitous in such examples as these to say the abnormal condition was due to an in-

[1] 1214^{20}. [2] 1068^{35}.

flammatory process. The simplest form of hypertrophy arises from increased function, as seen in the case of the skeleton, in the museum, of a man, who being paralysed in his lower limbs, used his arms for progression; here the bones of the upper extremity are seen to be larger than those of the lower.[1]

In this dense bone the increase of substance is interstitial: as in simple enlargement, the new material was beneath the periosteum and medullary membrane, so here it is around the Haversian canals, and the bone is not increased in size, but in density; thus the term *sclerosis* given by Lobstein. The ultimate condition of the bone is, no doubt, much the same in all these hypertrophies, whether they arise from inflammation or not; and thus in this piece of femur (which may be in reality a case of ostitis) the structure is very dense and like ivory, as it is also in this slice of an hypertrophied cranium. You might think that a bone presenting this ivory-like condition must be very different from an ordinary one; but, although it may be so to outward appearance, the microscope does not show much, except to a practised eye. The greater compactness must necessitate a closer texture, and thus, as might be expected, the Haversian canals are narrowed, or even in some places obliterated, and the same of the canaliculi. As in some of these cases it is tolerably certain that a rickety condition has preceded the hypertrophy, it appears that, first, there is an opening of the lamellæ, and widening of the cells, and that afterwards a deposit of bone and induration ensues, and thus the narrowing or obliteration of the canals. As regards the chemical change in a dense bone, it might be thought that because more hard, that, therefore, there was more earthy matter present; but this does not appear to be the case; analysis showing that the gelatine, or animal part, is in abnormal excess. It is highly probable that the various combinations of the bony constituents may differ, or that one phosphatic base be changed for another. I may here give you the formula for bone, which, being simple, I find I am able to carry in my memory, and, therefore, you can do the same. In 100 parts, remember that two-thirds are earthy and one-third animal or gelatinous, or 67 of one and 33 of the other. Now, as phosphate of lime is the principal constituent, we may subtract 10 for the others, leaving 57 for this salt; and of these 10 parts we may easily remember 8 for the carbonate of lime, and 1 each for the phosphate of magnesia and fluoride of calcium.

---

[1] 1000^{15}.

LOCAL HYPERTROPHY is generally divided into *exostosis* and *osteophyte*: the former referring especially to those circumscribed masses of bone growing from a part of the skeleton and of the same texture with it; while osteophyte refers rather to bone of loose texture, spongy, coral-like or diffused, and having generally an inflammatory origin. It is difficult, however, to draw a line between these, the separation being in many cases arbitrary; just as it is difficult often to distinguish between an exostosis and hypertrophy, if the latter be circumscribed.

EXOSTOSIS is the term given to a bony tumor arising on any part of the skeleton resembling the original structure, and more or less circumscribed. It is of various forms, and may be met with as projecting processes on the long bones,[1] as seen in many specimens in the museum. A very frequent position is the end of the great toe, where an exostosis occurs as a round tumor attached to the end of the phalanx; a section, as in these specimens,[2] shows that it is developed from fibro-cartilage, the latter forming its circumference, while the centre contains the bone or ossified portion: such tumors afford good opportunity for witnessing the process of ossification from cartilage. Exostoses on the skull are generally of a pyramidal form, and have often a deep furrow round their base; on the interior they exist as a number of wart-like elevations, and most frequently on os frontis.[3]

The cause of exostosis is for the most part unknown; it is a chronic growth of osseous tissue arising from an over-action of the part, due perhaps to injury, which has produced chronic inflammation. If, however, there is an evident inflammatory process, the term exostosis can scarcely be applied, the new bone being merely the consequence of some other more important condition; as, for instance, in these so-called exostoses surrounding the ends of the femur and tibia, in case of disease of the knee-joint; or in chronic rheumatic arthritis, where large new masses of bone are very remarkable. I may also show under this heading this mass of bone at occiput,[4] or ossification of the ligamentum nuchæ, and these specimens of ossification of the stylo-hyoid ligament.[5] Chemical analyses have not yet shown how exostoses differ from true bone; but no doubt there is some peculiarity in composition, and I believe I have heard it stated that there is more carbonate and less phosphate than in the natural bone. Various names have been given to the varieties

[1] 1152^{5}. [2] 1289^{17}. [3] 1073, 1074. [4] 1074^{35}. [5] 1074^{66}.

of exostoses, but I will not encumber your memories by repeating them; suffice it to say, that the two most common expressions in use are *spongy* and *ivory*, as indicative of growths having such resemblances. Occasionally, a bony tumor may spring up in the interior of a bone, and then the term *enostosis* has been given.

OSTEOPHYTE.—This term is used when the new bone is less concentrated, and puts on the form of needles or lamellæ. Various names have been given, according to their texture and form; as porous, stalactitic, velvety, all of which may be seen by an examination of our specimens. Under this head may be mentioned a very common affection of the spine, in which new bony matter is found on the bodies of the vertebræ, uniting them together.[1] More or less of this condition is found in a very large number of the bodies which we daily examine, especially in those of hard-working men. Some have called this condition ankylosis of the vertebræ, or ossification of the ligaments; but what we find in the first instance is an ossification of the intervertebral substance between several of the bones on one side, whereby slight bony projections are produced, the ossification not extending deeply into the fibro-cartilage. At a further stage, these several exostoses may unite on the bodies of the vertebræ, and thus a mass of bone is seen lying on their surface, resembling a thin lath of osseous material fixed upon the spine; or sometimes, as if a quantity of soft bone (as it were mortar) had been poured upon it and then hardened. We often find this on one side alone; and if the spine be curved, on the side of the concavity. There is a variety of this affection called by Rokitansky *puerperal osteophyte*, of which I have put up this as an apparent example.[2] He states, that during pregnancy a new deposition of bone takes place on the inner surface of the cranium, especially seen as a slight layer along the sides of the longitudinal sinus, and also in patches on other parts of calvaria and base. This specimen, from a young woman who died at the fifth month, shows certainly a new layer in the form of slight elevations along the upper surface of the skull and on frontal bone; but I question very much whether it is related to the puerperal state, until more extended observations are made, owing to the fact that such irregularities are constantly met with on the inner surface of the skulls of persons dying from a great variety of diseases.

---

[1] See several specimens on our shelves.

[2] 1072^{65}.

The simplest condition is that arising from *disuse*, a good example of which is seen in the skeleton already alluded to,[1] of the man who, being paralysed in his lower extremities, used his arms for progression: the bones of the leg were necessarily much wasted. Atrophy may occur thus in any *paralysed* part; and after the fracture of a bone, from injury to the nutrient artery, a partial wasting of the fractured ends may take place. It is also one of the conditions of *old age*, in which the rind of the bone becomes thinner, brittle, and porous, and the medullary canal enlarged and filled with a fatty matter.[2] The effects of age are also seen on the neck of the thigh bone in persons of advanced life, where the head sinks towards the shaft, the neck being shortened and cancellous in structure,[3] a condition carefully to be distinguished from the results of fracture. A somewhat similar atrophy to that often seen in old persons, is met with in limbs which have long been inactive from disease of the joints, or from the patient being bedridden; the bone is found to have a thin shell, and the interior medullary canal filled with a soft yellow matter consisting almost entirely of fat, and the cancellous structure of the bone also occupied by it. Atrophy may also arise from *pressure*. This is especially seen in aneurism of aorta, where the tumor, by constant pressure against the spine, gradually corrodes the bone until the bodies of the vertebræ are destroyed, and in some severe cases the canal laid open; the intervertebral cartilage remaining unaffected.[4] The loss of substance is merely by destruction of the bone, and in nowise can be called ulceration or caries. In the same way the sternum, ribs, &c., may be affected;[5] and the long bones, from the pressure of local aneurisms. In the calvaria you may often notice deep depressions along the sides of the longitudinal sinus, produced by the pressure of the Pacchionian bodies, and tumors of all kinds may produce like effects on the bones.

Apart from these manifest causes you may often find thinning of the bones: thus in the cranium, and especially in maniacs, this condition may be seen; although in these the skull may be at times very thick, and at others very thin, or the two conditions may be combined. Sometimes, on holding up a calvaria to the light, you may see it almost as thin as paper on each side of the median line; and sometimes, as in this example,[1] coupled with a depression on each side, is a raised ridge of bone along the temples. In this skeleton, which is evidently affected with rickets, the cranium, you will see, is remarkably thin,[2] and this fact is, I think, compatible with the statement before made, that hypertrophy may result from rickets, for in this case the patient is young and the bones soft; whereas, if the expanded porous bone had become filled with a hard bony material, an enlargement would have resulted. There is another remarkable atrophy of the bones of the skull which is not very uncommon, but yet which I do not remember to have read of in books; it is an extreme thinning of the petrous bones, orbital plates, and adjacent parts of the base, whereby they become quite diaphanous, and the point of the scalpel may be easily made to penetrate them. It is a condition accidentally met with, and does not indicate, as far as I am aware, any distinct pathological state.

---

[1] 1000^{15}. [2] 1134^{73}. [3] 1136, 1141, &c. [4] 1004^{80}. [5] 1044^{75}, 1485^{55}.

SPONGY HYPERTROPHY.

This is the condition to which some, probably, have given the name *osteoporosis*. The bone is changed into a light spongy mass, as if the whole tissue had opened out into a cancellous structure, or as if the whole medullary and vascular tissues had widened. These bones of the head are thus light and porous.[3] As a modification of this extreme change, we may allude to several examples in our museum, of enlargement of the bone, which you might perhaps think better classed with simple hypertrophy, but they need separation, since the tissue is more rarified than in health. In these specimens,[4] where all the bones of the skeleton are much enlarged, and in some instances heavy, you will see that the sections display a cancellous structure, and the bone, instead of being compact, has the appearance of mortar. In the skull this is very remarkable; the bone is twice as thick as natural, and the divisions of external and internal tables and diplöe are altogether lost, and the whole appearance is like that of a dried mass of mortar: on the interior the deep grooves for the meningeal arteries are well seen. In the section of the tibia the interior is cancellous, and the bone is curved as in rickets, and it is very probable that such a disease may

[1] 1055^{75}.

[2] 1000^{55}.

[3] 1069.

[4] 1069^{65}, 1132^{50}.

have given rise to the condition; and that speaking generally, the large spongy bones of children may, by a deposition of earthy matter, assume this character in after life.

INFLAMMATION

may be divided into that affecting the periosteum and that affecting the bone itself, or *periostitis* and *ostitis*. Similar results follow inflammation of bone as in other structures, with this difference, that products which cannot in complex organs conform to the nature of those organs, can assume in the present instance the character of bone. Thus we have the various exudations, with their disposition to form bone, and the other consequences, as ulceration and mortification, or caries and necrosis.

Periostitis.—The periosteal membrane may become inflamed from a local cause—as a blow; or from a constitutional cause—as scrofula or syphilis. The membrane becomes highly vascular or hyperemic, and after a short time an exudation occurs in and beneath it, by which it becomes swollen and soft, and is easily stripped off the bone: at a further stage lymph is effused, and this, for the most part, beneath the membrane, and if circumscribed constitutes a node. This exudation may be absorbed, and the part return to its natural condition; or it may undergo further changes, especially if a large part of the surface is affected: thus a diffused layer of exudation may become bony; and as this gradually takes place it becomes connected to the shaft by its bloodvessels, and thus an additional layer of bone is added to the old, the periosteum itself being somewhat thickened. This state will be seen by examining several bones in the museum,[1] in which you will see a distinct new layer added to the circumference of the shaft. The localised mass of lymph or node is generally absorbed, but if it ossifies it constitutes an exostosis. You might naturally inquire whether the exudation is afforded by the bone or the periosteum; in all probability, both these contribute their share, as one can scarcely be affected without the other, the vessels of both supplying a plasma; but inasmuch as the exudation is from the *surface* of the bone, the term periostitis is maintained. Should the inflammation be severe, as when arising from injury, and the powers of life are feeble, instead of a well-formed

[1] 1114^{60}.

lymph a suppuration takes place, and pus is poured out, as from other inflamed surfaces: the periosteum is destroyed, and an ulcer on the bone is produced, as in other structures.

Ostitis.—In this case the whole bone is involved in the inflammatory process. Not only is the periosteum externally and the medullary membrane internally affected, but the whole substance; the vessels of the bone proceeding from the vascular membrane, and the Haversian canals pour forth an exudation which becomes osseous. The bone, in consequence, becomes dense and resembles ivory, as seen in this portion of femur, where an inflammation has been long present as effect of injury,[1] a condition very like what I have already mentioned under the term hypertrophy. The medullary canal is closed, the Haversian canals narrowed, and in parts obliterated, and the canaliculi defective. Under hypertrophy too I have already spoken of thickening of the cranium and exostoses, which may in some cases have had an inflammatory origin; but as there was want of proof of this, I spoke of the condition without reference to its cause, but in this specimen[2] you will see the whole interior of the calvaria covered with a number of bony granulations, giving it a scabrous character. This was associated with chronic inflammation of the brain and its membranes, and its cause was clear.

Caries.—Referring to the case just mentioned, where, for example, there has been an injury to the tibia, the periosteum injured and bone exposed, an exudation occurs from the latter consisting of lymph and pus; the surface of bone slightly disintegrates, and is rough. This inflamed surface pouring out these fluids is like an ulcer elsewhere, and may, I think, with propriety be called caries, although this latter term has been used by some in a more limited sense. The process may be well witnessed on the exterior of the skull,[3] where, as in an ordinary ulcer, you may see a raw surface exuding a purulent fluid, and at the same time exhibiting on the edges some new or repaired tissue, which, in this instance, consists of new bone; as mentioned in the table, the process may be altogether local, or arising from a constitutional cause, as scrofula or syphilis. If the inflammation should attack the interior of a bone, as the cancellous structure, the bone disintegrates, and pus is poured out, an abscess is formed in the interior, and the matter enclosed in an adventitious membrane. When, then, a long bone or cranium is exposed, inflamed, and discharging a fluid, we may liken the sore to an ulcer in all respects; when, however, the deeper portions of bone are affected, and only communicate with the surface by sinuses, and especially if the spongy bones, as of tarsus or carpus, are involved, the term caries has been supposed to have a special significance, and by some has been wholly applied to disease of bone under these circumstances. I think, however, that the ulcerated condition of surface of bone cannot be separated from the inflammatory condition going on in deeper seated parts, and that both may be included under caries. These spongy bones in chronic inflammation, for example of the wrist, are involved in the same process as the soft parts, and communicate with the exterior by sinuses. They become very loose in texture, and porous; disintegrate slowly, and with difficulty recover their natural state, or are repaired; they do not absolutely die in mass, for then they would be called necrosed. I see no objection, however, to consider the process under ulceration, which implies an inflammation, with exudation and slow disintegration, and which is actually occurring in caries of these bones; a corrosion is slowly going on, and at the same time a thin purulent fluid is being poured out; without which exudation the term caries could hardly be applied. I think the difference is simply, that in one case the bone, as well as that of soft parts around, is affected on the surface, and in the other more deeply, the bone being necessarily imbedded in soft structures and the inflammatory exudations. It is thought, too, that a difference exists on account of the facility of the healing process in one case, and the impossibility of cure in the other. Undoubtedly, these carious spongy bones are with difficulty cured, because an integral change has taken place in the structure; but the statement must be taken with hesitation as being the invariable rule, for a portion of a bone may be carious, and gradually disintegrated, but afterwards a lymph may be thrown out, which organizes into a ligamentous tissue, or even new bone may be produced, ending in complete repair and recovery. I think these two sections of the tarsus show a repair of the bones. I may here inform you that this gradual decay of the bone is not due to its presence in the midst of purulent fluids, but from its own implication in the process; for experiments show that the action of purulent fluids and other secretions is quite inert on osseous tissue: the bone may be involved in suppurative action, and may be destroyed by pressure, but it is not dissolved by pus.

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[1] 1152^{55}. [2] 1072^{50}. [3] See several specimens of carious skull.

CARIES OF THE SPINE, is the term generally given to those cases where the bodies of the vertebræ are slowly destroyed, and angular curvature is the result. It has generally been regarded as a scrofulous disease of the bone, and, no doubt, in children such is often the case, although in many instances there is little evidence of scrofula, and much less in adults. There is no reason to suppose in many cases that the disease is of this nature, or even that it begins in the bones at all. For many years I have demonstrated in the post-mortem room the disease beginning in the intervertebral substance; an opinion also insisted upon by Mr. William Adams; for when in early stages of the disease the morbid process can be ascertained, it is this part which appears to be the first involved. At later stages, we find all the tissues implicated, but even then it is often clear in what direction the disease has been propagated; for instance, you may often find a vertebra apparently destroyed in its middle by disease, but on closer examination the two portions which appear to be the remains of one, belong to two separate bones, the disease having commenced between them. Moreover, the soft cheesy matter amongst the bones has been called, too hastily, scrofulous or tuberculous matter, when there is no appearance of tubercle in any other part of the body; the material merely being lymph in a process of fatty decay, and mixed with it, probably, some debris of osseous matter; also loose portions of necrotic bone may be seen in the bodies of the vertebræ. In this specimen, which I took the other day from the spine of a strong and previously healthy man, there was not the slightest indication of scrofula, and according to the history I have no doubt the disease began in the intervertebral substance. The man strained his back in carrying a weight, the intervertebral substance was slightly lacerated, some lymph was thrown out, and subsequently a gradual destruction of the whole cartilage took place, and at last the adjacent surfaces of the bones were involved, as seen here.[1] You may see, then, in some of these specimens a yellow soft matter, affecting only the intervertebral substance; in others, a destruction of this substance, with the adjacent bones; and in others, numerous vertebræ altogether destroyed. You will see also in these specimens how repair takes place: in some instances the fragments of bone are held together by ligamentous tissue, and in others they are firmly conglomerated into one irregular mass of bone. An extreme angular curvature necessarily results from the vertebræ thus falling together. You will observe how remarkably the medulla follows the curvature of the bone, and how it escapes mischief in numerous cases. *Lumbar* and *psoas abscess* are shown very imperfectly in these dried preparations. They result from caries of spine, and, as you know, are not distinct diseases, nor do they represent any different forms of malady. In this case, where there is disease between fifth and sixth dorsal vertebræ,[1] a lumbar abscess existed on one side, and a psoas on the other. Sometimes the adjacent lower ribs are involved in the caries. Disease of the *odontoid process* may occur as a separate affection. In this specimen[2] you will see a remarkable instance of this process becoming carious and making its way out through the pharynx, followed by complete recovery of the patient. Disease between the two first vertebræ and atlas and occiput is not uncommon, and results in ankylosis; numerous specimens of which you will see on our shelves. In all our specimens of disease of the *cervical vertebræ*, you will see that the abscesses which accompanied them opened into the pharynx. Caries of the cranium I have already alluded to; but here are other specimens which show rather a simple erosion as effects of *lupus*,[3] or facial cancer; you will perceive there is no new deposit of bone around the decaying edges as in caries, but a simple erosion of the structure.

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[1] Numerous specimens show this process.

NECROSIS.—If death follows the inflammatory changes in bone, it is called necrosis; some of the most remarkable instances of repair witnessed in the human body are seen in connection with this process, as where a long bone dies and is replaced by a new one. There are all degrees of the decaying process: thus, in the case before alluded to, of a bone like the tibia being injured and exposed, a simple inflammatory action may be set up, and a speedy cure result; or the bone may become ulcerated, in the same way as the soft parts, and after a more lengthened period form granulations, and heal; or again, if a large portion of the periosteum be destroyed, the bone is likely to die; the periosteum being removed, the vascular supply is cut off, and the exposed surface mortifies; the bone becoming white, and subsequently black. To a certain depth only does this change occur; the deeper seated portion of shaft being well supplied by the medullary membrane and adjacent vessels, a line of separation ensues between the part thus nourished and the exterior. Inflammatory exudation takes place in this line, so that in the course of some weeks the dead portion becomes detached, leaving the living raw sur-

[1] 1021^{30}. [2] 1018^{15} [3] 1087^{48}, 1080^{50} (?)

face below covered with lymph or vascular granulations; these then become changed, partly into new bone and partly into a new periosteum, which, with some fibrous tissue, forms with the adjacent soft parts a cicatrix. A small scale of bone may thus come off; or, if some inches of the shaft be exposed, a portion extending to the medulla may come away; if more, of course there is danger of death to the whole bone. This process of separation of a portion of dead bone may be well seen in these specimens of diseased craniums, where, owing to the distinct vascular supply of the interior and exterior of the skull, large portions of the external table have come away without interfering with the deeper portions; you will here see a large piece of bone, the size of the palm of the hand, in the process of separation, but it is merely the external table, and on looking at it you will also see how it is bevelled off, by which the external surface is much larger than that within; even in this specimen, where necrosis has resulted from severe injury, involving the whole thickness of skull, the internal table is only affected at a single spot in the centre of this large piece, which has come away from the external surface.

The process of separation, or *exfoliation*, as it is called, is seen often at the end of a bone of an amputated stump; for in such a case it is far from uncommon for an inflammatory process and sloughing to go on like that already mentioned, and the end of the bone becoming involved in the same action, it is exposed, the periosteum removed, and then it inevitably dies. At the part where the periosteum remains intact, and adjacent to soft parts, an exudation is taking place, as before mentioned, and some new bone is formed on the surface. The interior of the bone appears to suffer more than the exterior: suppuration involving the medullary membrane extends up the bone for a considerable distance, and the consequence is that the interior dies to a greater height than the exterior, and the inner surface of bone being necessarily involved, necrosis extends to a much greater distance within the canal than on the exterior; consequently, when after some weeks the dead bone comes away, the part above the level of the stump has a conical form, that is, the external projecting part is dead throughout, but instead of a separation taking place transversely immediately above this, a long piece comes out of the interior of the bone, the latter being often as long, or longer, than the protruding part.[1] The stump then heals; and if an opportunity for subsequent examination occur, some new bone will be seen to have formed at the point of separation of the necrotic part. I may here remark, that it is this diseased condition of the bone of the stump which probably so often is the cause of pyæmia.

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[1] 1159, and following preparations, showing separation from stump.

The most remarkable cases of necrosis are where the whole shaft dies, as is especially seen in children. A bone like the tibia may, from injury or other cause, undergo an extensive inflammation, completely die in its whole length, excepting the epiphyses, leaving the joints unaffected, and then a new bone may form around the old, and which, being more spongy, resembles the bark of a tree around the true wood. The top and bottom of this cylinder become united to the epiphyses as the original shaft is separated, and when the latter is removed the outer case of the bone gradually contracts to the dimensions of the old (though seldom quite so), leaving the medullary canal within as before. The dead bone within is called the *sequestrum*, and the new one around, the *capsule;* as the former has decayed, so it has generally become separated into distinct portions, and the way in which these are removed is through openings or *cloacæ*,[1] which correspond to the fistulous openings in the skin. Surgeons are in the habit of passing probes through these openings and feeling for loose bone within, which is then removed, if practicable. I may here mention to you, that in a specimen like this,[2] where the new bone is bent, it is probable that the attempt to remove the old bone was made too early, for it is necessary that it should remain a sufficient length of time as a model for the new bone to be formed upon, for if not, the latter being soft, is acted on by the muscles, and becomes distorted; the same happens in the lower jaw, if necrotic bone be removed at too early a period. You will learn in the surgical lectures at what period interference is necessary; but I show you these specimens that you may understand how the new bone is modelled upon the old. These examples of exfoliation of large portions of lower jaw[3] occur in children after the exanthemata, and also in lucifer-match makers, a specimen of which I preserved more than twelve years ago. The cause of the necrosis in these cases appears to be the fumes of sulphur acting directly on the part, and it is said through decayed teeth; but whether this is so or not, I cannot give an opinion. In young persons, in necrosis of long bones, the shaft alone dies, and the epiphyses remaining, the joint escapes; but this is not universally the case, and in adults the disease is very likely to continue to the extreme ends of the bones; in such instances, with an involving of the joint, there can be little hope of repair, but I think it posssible for an epiphysis to be renewed, although with ankylosis of the joint, as seen in this specimen.[1]

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[1] 1103.

[2] 1103^{75}.

[3] See several specimens.

A very common spot for a local necrosis is the end of a bone—as the tibia, commencing by a process which has generally been called tuberculous, but of which there is a want of proof. An inflammatory process, followed by death of the bone, occurs, and this proceeding to the articular surface, the joint is involved; if not, the necrotic bone may be removed in mass or by disintegration, and then generally a cavity remains, and lined by a smooth membrane.

The process by which the new bone is formed around the old, in case of its death, is not perfectly understood in all its details, particularly with respect to the parts of the tissue which are employed in the process—how much the periosteum, and how much the bone itself. In most cases, where the process is early seen, the exudation appears between the periosteum and the bone; for when the vascular connection between the membrane and the bone is so intimate, one can scarcely be affected without the other, and it is possible that in some cases some portion of the old bone may be incorporated with the new. One reason, probably, of the great difficulty in ascertaining how far the periosteum is engaged, is, that when an exudation takes place in it the membrane becomes infiltrated and swollen, and so altered in character that it is scarcely recognizable as a distinct structure, just as happens in synovial and other serous membranes.

If a piece of dead bone which has been removed be examined minutely, it is evident that a great decay has taken place within it, particularly in the course of the Haversian canals. These, instead of showing a regular and normal outline, are irregular in shape and enlarged, forming in a longitudinal section long black channels, as if the bone had begun to disintegrate in the course of these vessels. This is seen in this microscopic drawing.

INJURY.

We include under this especially fracture and loss of substance, as in injury to the skull.

In the case of fracture an exudation takes place around the ends of the bones, and which, becoming osseous, unites them together. In many instances a large quantity of this ossifying material is rapidly produced, and, forming a large mass around the fractured ends, is called the provisional callus, from its being afterwards removed; in the mean time, the broken ends are becoming united by exudation from their surfaces, and a plug of osseous material holds them together within. This external or provisional callus, however, is not necessary, but occurs mostly in those cases where perfect rest cannot be commanded, as in the lower animals, in which the process has been mostly observed. Experiments in them, however, cannot be taken as exemplifying the process in man, although this has been done to a great extent. A visit to the accident ward will inform you that a facture may at once unite without any such provisional means, for you will not fail to find some cases of fracture of tibia where the line of union can scarcely be felt. In the case of fractured ribs, if good apposition be kept, the union may take place without scarcely a trace of the original injury being seen, but if much motion, a callus or node will be formed. This is well seen in our skeleton of the hippopotamus, and shows that the example of the lower animals cannot be taken in studying the process of union in man; this animal has had all its ribs fractured, and at every injured spot there is a large node. The want of rest on the part of this creature, and the necessary movement of the ribs, caused, no doubt, the excess of bony exudation. It is not uncommon, however, to find this excess, and even two or three ribs united together if the injury has been severe. In this preparation of fractured clavicle, a large external temporary callus is seen uniting the bones together.[1] In such a case, it would have become again absorbed when the ends were firmly united; in the same way the internal mass in the medullary canal is removed, and the channel again opened, though very often this remains permanently partly closed. Where the bones overlap, the sides unite, the ends being rounded off, and medullary canal closed; if a section of such be made, the original wall of the bone may be seen at the line of junction. Experiments on animals and observations on the human subject have not yet clearly shown which are the most important parts engaged in the process of repair, and especially the relative importance of bone and periosteum. You should remember, in considering this question, that all exudations have a tendency to

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[1] 1160^{48}.

[1] 1094^{95}.

approach in character the tissue to which they are contiguous, and this independently of the source of the plasma. Thus, if lymph be poured out in the neighbourhood of bone, its tendency is to become osseous. I think, therefore, that immediately after a fracture an inflammatory process is set up, and an exudation occurs from the bone, periosteum, and the softer structures, which soon changes into osseous matter. Of course, if the injury to surrounding parts be very slight, the bone itself with its membranes may be the only parts engaged in the reparative process. As the bone is the structure immediately affected, so, of course, we should expect to find here the source of the exudation; and as its periosteum is highly vascular, there can be little doubt that its contribution to the plasma is most important. I have already mentioned that the end of the bones themselves, as well as the interior, furnish a reparative material. The principal question appears to be in reference to the relative importance of the periosteum, and to what degree it may be injured or stripped off, and yet reparation occur. Late experiments have shown that if a piece of periosteum be transplanted to any part of the body, an osseous exudation will soon take place around it.

In as much as the long bones are developed, in the first place, from cartilage, it was formerly thought that in all production of new bone the same process was followed, yet this does not appear to be the case. In the lower animals certainly, and sometimes in the human subject, cartilage may be met with, yet, generally, it is the lymph or fibrous elements which at once change into bone, a process first shown by Sharpey, as occurring in the development of the cranium.

FRACTURE OF NECK OF THIGHBONE within the capsule deserves especial mention, as having much pathological interest. It is known that this fracture is very rarely, if ever, repaired by bone, and many reasons have been given for this. One is that all fractures in joints are seldom thus repaired, both because being surrounded merely by a synovial fluid, there is an absence of all those soft textures which could assist in supplying the necessary pabulum, and also because of the difficulty of keeping the parts of a joint in perfect apposition: reasons which obtain in other joints; for in the olecranon[1] osseous union is rare, and as regards the patella the latter explanation is particularly evident, for in vertical fracture of the bone, where the difficulty of preserving contact is not so great, an osseous union may

[1] 1119^{36}.

occur.[1] Another reason for non-union is, that in the case of fractured cervix femoris the nutritious artery of the neck may be injured, so that the only supply of blood to the head is by the round ligament. Old age too, the time in which this accident occurs, has been considered instrumental in the prevention of union; but of this there is more doubt, unless it be owing to degenerative changes, which might be previously going on in the neck of the bone, for union in other parts of the skeleton may take place in old people; and, on the other hand, a want of osseous union in the joint is observed in the young; for example, this bone is from a child who received a severe injury, and broke the upper part of the os femoris, both within the capsule and without; the external fracture appears to have been repaired, but the inner shows no signs of cure.[2] You will see, by observing these specimens of fractured cervix femoris, how little repair has advanced after several weeks or months, and if the parts have in any way united, it is only by some ligamentous tissue. Such a union is all that you can generally expect. In this specimen,[3] which we obtained the other day from a woman who fractured the neck of the bone five years before, there is good ligamentous union, and, besides this, some nodules of cartilage between the broken extremities. In all these cases you will see how the fractured ends have been absorbed, and the neck thus considerably reduced in length. Amongst these specimens there are some which are labelled as doubtful instances of bony union; and the difficulty of giving a correct judgment is often very great, for this reason, that a change very similar to that which an injury might produce is caused by senile disease. An old person, for example, has been subject for a year or two to the changes, which I have shown you are so often present in the neck of the thigh bone, and which produce a shortening of this part. If now, in consequence of such impairment of the joint, the person should fall, and owing to the bruising take to his bed, and a medical opinion be sought, the leg being found powerless and shortened, it might be thought that a fracture had occurred, and then, if the case be watched, and after a year or two a *post-mortem* examination take place, it is highly probable that the distorted appearance of the neck of the bone may somewhat resemble a united fracture; for if a section be made, the irregular form of the cancellous structure may display some fibres of bone corresponding in place to a supposed line of fracture; and if, moreover, the joint has been affected by chronic rheumatic arthritis, some new bone may have been formed in the surrounding parts.

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[1] 1211. [2] 1184. [3] 1185^5.

The fracture external to the capsule, in which the neck is driven into the broken trochanters, unites easily by new bone, which binds all the parts together—the injury known as *impacted fracture*.

Fracture of Skull.—This subject will be given in full in the surgical lectures, and I will therefore merely ask you to carefully regard these specimens; you will see that they can be divided into two classes of cases, which correspond with a similar practical division you meet with in the wards, according to the nature of the injury and the chances of cure. The distinction is simply this: slight and severe cases, or those where the injury has been due to a blow producing a circumscribed wound, and those where it has arisen from the whole body having fallen from a height; in the latter cases, the injury to the cranium and brain is so great that recovery is rarely possible. In the cases, however, which recover, the fracture has been caused by a blow or kick on the head, or by bullet or sabre wounds on the field of battle, and the part struck is that only which is affected. In practice, the difference in the two kinds of injury is all important to remember; for in the one case recovery is scarcely possible, while in the other you may meet with a fair chance of success by judicious treatment. It is to the latter class that these numerous specimens of repaired fracture belong. When a person falls from a height he generally strikes near the vertex; or, if he be thrown from a vehicle, he strikes the head laterally, near the upper part; in both cases the fracture extends far beyond the point of contact, and very often to the base of the skull across the temporal bone, producing bleeding from the ear, if the membrana tympani is torn, or a discharge of watery fluid, which Mr. Hilton has shown to be subarachnoid; or one of the large sinuses may be opened, leading to death simply from hæmorrhage, besides many other lesions. You will see by these specimens that the coronal[1] and other sutures may be completely separated, and if the person fall on his vertex, the momentum of the body acting through the spine will drive in a rim of bone around the foramen magnum, as you here perceive.[2] In all these cases you will see the fractures extend from the point of immediate injury, and that in none is there a fracture opposite to the seat of blow; and thus, as all my experience shows, contre-coup has no effect on the cranium, its influence being

[1] 1086^{80}.

[2] 1082^{50}.

exerted merely on the soft parts, and thus the brain opposite to the seat of injury is contused. For example: as the injury very commonly occurs on the upper part of side of head, so the base of middle lobe of brain, on the opposite side, is found bruised or crushed: effusion of blood thus occurs from the injured brain, as well as blood outside dura mater from lacerated meningeal arteries. I might also mention that the central parts are sometimes injured by the concussion, and thus I have on several occasions found the septum lucidum torn, together with blood in the ventricles; and occasionally, though less commonly, blood effused in various parts of the substance of the brain. I mention this, because sometimes there might be a question as to the cause of the effusion; whether from an injury, or spontaneous from disease. In this specimen[1] you will see a good example of what sometimes happens when the skull is injured—that it cracks, and that one table may suffer more than the other; thus you will see this fissure extending two inches and a half externally, and yet showing no trace within; and also this shorter fracture within, which is not seen on the outside. In *circumscribed fracture*, the part struck is that which is often only affected. Comminuted portions of bone may be removed, and recovery take place; or, even if a fissure should extend from it, there is chance of union under these circumstances of injury. Thus, in this specimen,[2] taken from a lad who was lately under the care of Mr. Birkett, a blow from a hammer broke up the bone on the side of the head, and caused a fissure to run all around the forehead; at the time of the boy's death, eleven weeks afterwards, from abscess in the brain, the fracture had perfectly healed, and the bone almost as strong as ever. Here are several other portions of skull,[3] picked up from the field of battle, showing very severe injuries, which have been repaired, and effectually repaired, as proved by the subjects of them having been able to engage in service again. These long fissures have, no doubt, been caused by sabre wounds, and though the inner table is reached, recovery has taken place. In this, where the bone has been comminuted, but portions not removed, a union has occurred between the pieces. Where there is actual loss of bone, as from trephining, repair does not occur; but the dura mater on one side, and the scalp with the new cicatrix on the other, become united into a firm membrane for the protection of the brain. In this specimen,[4] where there has been loss of bone, but whether from injury or disease not very clear, the

[1] 1083^{75}. [2] 1086^{65}. [3] 1085^{80}. [4] 1077^{70}.

membrane taking its place is seen to have a few spiculæ of osseous matter shooting from the inner table, and a few isolated deposits in its centre.

In children, bones may be *bent*, as in this os femoris.[1] The same condition is not unfrequently met with in the clavicle, particularly in scrofulous infants. I intended to show you a specimen of a cranium in which the bones were fractured at birth from being forcibly propelled by the uterus through a narrow pelvis; but it is unfortunately mislaid.

False Joint.—When the fractured ends of a bone do not unite, a false joint is formed. You must remember, however, that it is quite the exception to have a new perfect joint produced; all you witness is an exudation of lymph, which becomes ligamentous, and tying together the two ends of the bone allows free play between them. Thus in this specimen[2] of a humerus, where a fracture had failed to unite eight years before, the ends, as you see, have become pointed and firmly joined by a strong ligamentous band, but there are no structures present as you meet with in a joint. Probably it is where there is a broader surface of contact that a more perfect joint is produced. Thus, in this specimen of forearm,[3] the ends of the bones are surrounded by something like a capsular ligament, and within is a synovial sac and fluid.

RICKETS.

This is a disease of childhood in which the cartilaginous material predominates over the earthy. The disease begins in the lower limbs, which bend forward and outward, while the epiphyses become enlarged; subsequently the ribs are affected, which also bend and thrust out the sternum, producing pigeon-breast, and the pelvic bones become squeezed together, and the spine gives way. In the early stage of the disease the medullary membrane and periosteum become red from vascularity, and afterwards a soft, red gelatinous kind of material is effused into the substance of the bones and its canals; the bone being thus more vascular, and the tissue rarefied and filled with this soft material, yields by pressure and becomes bent; the earthy matter being only about a quarter of the whole mass, instead of forming two-thirds. Subsequently the bone

[1] 1197^{82}.

[2] 1110^{80}.

[3] 1119^{20}.

hardens from a fresh deposition of ossific matter; and if it has not recovered from its bent form at this period, it remains permanently curved. Thus the os femoris bends at first outward and forward, and then again inwards, to meet its fellow at the knee, as you see in this skeleton,[1] the convex parts of the bone becoming very hard. The legs from the knee take a direction outwards, and thus the convexity of the tibia and fibula is inwards. This occurs only in extreme cases, for in less degrees of the disease the tibia merely has a tendency forwards, and the fibula is little changed; if severe, however, the latter bone becomes convex and flat like a rib,[2] and the convexity turned inwards consists of very dense bone. The changes in pelvis and other parts I will presently show you.

MOLLITIES OSSIUM, OR OSTEOMALACIA.

This differs from the disease last mentioned, in being one which affects the adult, and in most instances has come on in women during pregnancy; this, however, is by no means always the case, as the disease occurs in men, and in persons of both sexes at advanced periods of life. There is, as in rickets, a preponderance of the animal over the earthy constituents, the latter gradually being lost, and observed in many cases to be carried off by the urine; but, unlike rickets, the disease does not generally stop at a certain period, and the patient in the mean time able to walk about, but it progresses in most cases to a fatal termination, during which time the patient is bedridden, and the different parts of the body have a tendency to fall together, the body becoming bent like a bow, and the limbs drawn towards it; these capable of being moved in all directions, or even carried over the head. The bones are so soft that they may be cut with a knife, and so light that they float on water, as in the case of these vertebræ.[3] The earthy matter is all but gone, and nothing but the gelatinous part remains. In some cases the bone appears atrophied, its outer case being thin, and within is a quantity of fatty matter;[4] and therefore it would seem as if there were two forms of mollities—the one where the earthy constituent of the bone is removed, leaving the animal; and the other, which appears rather a fatty degeneration. The specific gravity of this vertebra is scarcely ·7, while healthy bone is nearly 2, or three

[1] 1000^{10}. [2] 1213^{72}. [3] 1004^{88}. [4] 1160^{64}.

times as heavy. The bones may bend and break, and subsequently unite, as seen in these ribs;[1] the scapula may become thin as paper and doubled together, and the same in the os ilii[2] and sacrum.

ALTERATIONS IN FORM OF HEAD, SPINE, THORAX, AND PELVIS.

Instead of speaking of the changes which take place in the various bones under the different forms of maladies already mentioned, it will be more convenient to regard the particular parts of the skeleton at the same time, and compare them together.

HEAD.—The most remarkable morbid condition affecting the head is *hydrocephalus*. In such case the fluid in the ventricles of the brain expands the head, and the bones are widely separated, so that, at the usual time of closure of the sutures and fontanelles, much of the skull still remains membranous. If the child live, and the fluid is not then absorbed, distinct points of ossification take place, and thus separate bones grow in the interstices of the regular ones. These are accordingly of various shapes and sizes, and are named *ossa triquetra*, or Wormian bones. These you will see are of very great size in this remarkable hydrocephalic head of the lad Cardinal,[3] where the head measures thirty-three inches in circumference. In this instance of hydrocephalus, where adult age was reached, the head was simply enlarged. You will observe that the form of the orbit is very remarkable in these crania; the superior plate, instead of being horizontal, is inclined more to the vertical, and this gives the eyes the peculiar roll so characteristic of hydrocephalus;[4] at least, this is so in all the infants' skulls before us, though not in those of an older age.

In *rickets* the head is well known to be large, and often overhanging in front, but I am not sure that a rickety cranium can afford any characteristic for recognition. As regards the texture of the bone, I think very opposite conditions may exist, according to the stage of the disease; for, although at first a rickety bone is light and porous, it may afterwards receive into this expanded structure an additional quantity of bone, and become much thicker and heavier. Thus in this specimen of a rickety skeleton of a youth, the head is light and porous;[5] but I believe, also, some of those cases of spongy hypertrophy, which I have already shown you, where the cranium weighs heavier than natural, may also be the result of rickets; at least, in both forms of skull the corresponding bones of the limbs show evidence of the disease.

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[1] 1098^{50}. [2] 1129^{60}. [3] 1000. [4] 1057. [5] 1000^{35}.

Our museum also presents some specimens of malformed and unsymmetrical skulls. In this you will see the sides flattened and raised up in ridges towards the top;[1] in this one you will see the sides are not alike;[2] this is a skull of the flat-headed Indian,[3] whose front part of the head was thus flattened in infancy by artificial pressure.

SPINE.—*Angular curvature* results from disease and destruction of the bodies of the vertebræ, and their falling together in consequence; this occurring mostly in the dorsal region. Where the bodies of several are destroyed, the curvature of the back is excessive, as in this case, where the nine lower dorsal and three upper lumbar are destroyed, and their remains form a small angular mass,[4] to which the transverse processes and ribs are attached. In some cases the remains of the vertebræ are held together by ligamentous tissue. The cord is bent, and follows the inequalities of the spine; and it is remarkable to what extent the bones may be affected without the cord participating: a fact which may be compared with the opposite one, of the great frequency of disease of the spinal cord independent of disease of the bone.

Lateral Curvature.—A slight curvature is very common, especially in women; but there seems no limit to its extent, until, indeed, the spine shall be bent down parallel with itself, as is seen in this very remarkable specimen,[5] where the ribs actually pass down in front of it. It will be seen, on examining this and other specimens of lateral curvature, that the vertebræ themselves are not diseased, but the twisting is due almost entirely to the wedge-like form of the cartilage between them, this being wide on the convex side and narrow on the concave; on the latter the bones actually touch, and in some cases are superficially ankylosed; and sometimes in the same spot in the concavity the heads of the ribs are so crowded together, that ankylosis has taken place, both to the vertebræ and to one another. By regarding attentively a spine thus laterally curved, you will see that the vertebræ have suffered a rotation on their axes, or have turned on themselves, as will naturally be the case if a spine be thus forcibly bent downwards;

[1] 1055^{75}. [2] 1062^{50}. [3] 1059. [4] 1006^{30}. [5] 1006^{40}.

and consequently you will see that the front of the bodies of the vertebræ face to the convexity, while the spinous processes are seen in the concavity, the transverse processes projecting backward. The chest is necessarily carried backwards with the spine, and thus the hump on the back is formed by the angles of the ribs as well as transverse processes of vertebræ.

In *rickets* the spine is much curved, so that the lumbar vertebræ, with promontory of sacrum, project much forwards, and the back necessarily falls in.

In *mollities ossium* the tendency is for the head and pelvis to fall together, and the spine is thus bent outwards, or is convex, in the contrary way to that of rickets.

THORAX.—In *lateral curvature*, the thorax is necessarily much distorted, one side being contracted and the other dilated. By looking at this preparation[1] you will see what generally occurs. The spine is bent so that the convexity is on the right and concavity on the left; and as I have already shown you that the vertebræ also turn on their axes, so that the transverse processes point backwards, the ribs are necessarily carried in the same direction, and the two together form the hump. This right side is, however, of necessity much smaller than the left on the side of the concavity of the spine, which is two or three times its capacity. As, however, the right side projects further backward, its antero-posterior measurement is greater. On the right, too, the ribs are rounder, whereas on the left they are flat, and at one spot slightly concave. Five of these ribs are ankylosed where they join the spine. The sternum keeps its natural position in the median line. In slight lateral curvature, the chest may be carried with it on one side without much altering its form; and where there is double curvature, various other variations of form may arise; but the usual condition is this, which I show you.

In *angular curvature*, the chest is symmetrical, but bends down towards the pelvis, so that, as you see in this specimen,[2] the lower ribs reach below the ilium. The vertical measurement is decreased, while the antero-posterior is considerably increased, and the sternum is carried forward, so that, as you see, it is on a vertical plane considerably anterior to that of the face.

In *rickets*, the condition is known as the *pigeon-breast*, the sternum being prominent in front, and with lateral flattening of the ribs.

[1] 1006^{66}. [2] 1006^{70}.

This condition is constantly associated with other manifestations of a weakly constitution, but its immediate cause is due probably to feeble powers of inspiration. Whatever in an infant tends to a want of due expansion of the lungs, would necessarily tend to this state. If the lungs be not filled, and chest not fully expanded, as growth proceeds, the ribs bending downwards meet the cartilages at an angle, which then become thrust forward with the sternum attached to them in front. This lateral flattening, with a projection of the sternum, would be artificially produced in a young child if pressure were made on the sides of the chest, and then kept contracted as in expiration; and we can see, therefore, how a want of power in the infant will prevent the expansion of the chest, and keep it in a permanently contracted condition. It has been thought that this may be immediately due, in some cases, to enlargement of the tonsils in infants preventing the proper amount of air to the lungs. We think this is an efficient cause, and one that constantly exists, but whether it be due to it, I cannot possibly say; but I think, as a rule, that a pigeon-chest is more usually acquired, rather than found existing at birth.

In *emphysema* and *bronchitis*, an opposite condition prevails, the chest being, as it were, in a permanent state of inspiration; owing to the loss of elasticity in lungs, and difficulty of exit of air, the chest remains expanded, and becomes permanently altered in shape. Thus, in the child who, after hooping-cough, becomes the subject of confirmed emphysema, the chest remains fixed in its dilated state, and it assumes a rounded or *barrel-shaped* form, having the diameter from before to behind considerably increased. In the living subject, too, you may notice the elevated condition of the shoulders.

In *mollities ossium*, the parts of the chest have a tendencey to fall together, as you see in this specimen;[1] the ribs are softened, some fractured and bent into various shapes, and the chest falls in at the sides. The spine is curved, forming a convexity backwards, and the sternum is often, as you see here, bent in its middle.

Other changes may occur in the chest from disease. Thus, from effects of pleurisy, one side may be contracted, or even the spine be distorted; and from the same cause, a local contraction or depression may arise at lower part of chest, or the upper part beneath clavicle.

[1] 1044^{62}.

Pelvis—May be of various forms in different diseases, and, first, I will mention to you these two conditions, arising in rickets and osteomalacia. The reason of the difference in these two varieties of softening of the bone has not, I believe, been determined, but I have no doubt that a little study of the subject would explain it. It may be remembered, that one is the disease of childhood, and the other of adult age; that the one ceases at a certain stage, and while the patient is still able to walk, while the other continues often to a fatal result, and the patient is for a long time bedridden. One or more of these circumstances probably determine the shape of the pelvis.

In *rickets*, the sacrum, with the lumbar vertebræ, are bent forwards, so that the former almost meets the symphysis pubis, which is pushed upwards to meet it. The cavity of the pelvis is thus divided into two, and may be likened to an hourglass, as you here see. The sacrum is in some cases almost horizontal, and the tuberosities with rami of ischia and pubes are everted.

In *osteomalacia* or *mollities ossium*, not only is the sacrum bent downwards, and in bad cases the ossa ilii with it, but the acetabula with the body of the pubis are thrust upwards, and thus the symphysis pubis is forced outwards like a beak,[1] and so this form of pelvis has been called the rostrated or beaked pelvis. In the case of rickets, you will see, the pubis is pushed backwards against the spine, and there is no bending inwards of the acetabula.

In *angular curvature of spine*, the pelvis is generally deep, like the thorax, as you see in this specimen.[2]

In *lateral curvature*, the pelvis generally becomes slightly distorted, owing to its sinking down on the side of the curvature. In this specimen,[3] you will see that on the side of the convexity the pelvis is raised, so that the tuberosity of the ischium on this side is higher than that on the other, and the pelvis is necessarily distorted.

The *oblique pelvis of Naegelé* is due to ankylosis of the sacro-iliac synchondrosis, occurring in infancy, or even in intra-uterine life, so that during development a distortion naturally ensues. I think we may look upon this as a specimen of the affection.[4] You see the right sacro-iliac joint is ankylosed, and the pelvis is unsymmetrical. The disease of the joint has been accompanied by much loss of substance to the ilium and sacrum on the right side, and thus the latter bone is thrown in this direction, and the whole

[1] 1124^{90}. [2] 1006^{70}. [3] 1000^{25}. [4] 1125^{50}.

right side of pelvis is smaller than the left. Thus, the front of sacrum does not face the symphysis pubis, and if the diagonal measurement be taken from this diseased joint to left acetabulum on opposite side, it will be seen to be greater than that taken in the other diagonal.

ADVENTITIOUS GROWTHS.

I must remind you of the general remarks which I made on cancer and new growths in my first lecture.[1] I said that cancer, or the most malignant form of growth, is composed essentially of cells; while a less malignant growth shows a tendency in its cells to become fibres, constituting a malignant fibroid; while others, having a tendency still more fibrous in character, only recur at their original seat after removal; while others seem altogether innocent, or have special characters. Such growths form the common varieties of encephaloid cancer, fibrous cancer, malignant fibroid, recurrent fibroid, fibro-plastic, &c.; and I think the disposition for such growths to occur near bone does not alter their essential character, but causes them to assume other peculiarities from their position; that is, they partly ossify, or contain some of those structures which are intimately connected with the formation of bone, as cartilage, or myeloid matter. These new characters, however, added to them, may constitute the whole structure of many tumors originating in the bone itself. Thus, a *bony tumor* or an *enchondromatous*, or a *myeloid*, may arise from bone, and these may as a general rule be called innocent, or local; the semi-malignant tumors of bone consist, I believe, of the semi-malignant fibrous tumors met with elsewhere, but growing near the bone, contain some osseous matter and cartilage: these are the various forms of *osteosarcoma;* while the malignant tumors of bone consist of cancer, either existing in its ordinary soft, simple character, or with various additions to it of the bony elements. Thus there is *encephaloid* and *scirrhous cancer* of bone, as elsewhere; but if the latter is wholly ossified, we have *osteoid* cancer, and in certain cases other elements, as cartilage, or myeloid matter, may be present within it. These various tumors of bone, I know from experience, have always puzzled students; but I think by dividing them into three divisions we shall simplify the matter:—The innocent, or those consisting principally of bony elements; the highly malignant, consisting of ordinary simple cancer, or the same with bony elements added; and the intermediate in malignity, or osteosarcomatous, corresponding to the recurrent and malignant fibroid elsewhere, but containing varying amounts of osseous structure.

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[1] See Part II.

CARCINOMA MEDULLARE is characterized elsewhere by its disposition to invade and destroy all the tissues near which it grows, and the same effects are seen in the bone. It begins very commonly within the medullary canal, and gradually invades the osseous structure until it destroys it, and thus a mass about the size of a walnut may cause the fracture of a long bone, and you may be pretty sure that when you suspect disease of a bone, and it breaks, that cancer is present. Here you may see several specimens of soft cancer in bones, destroying them; in this femur and humerus,[1] small nodules have caused them to break; also, in this humerus,[2] you may see a mass in the head of the bone which has partly destroyed the shaft, and is making its way out; and the same in this rib, which it has expanded into a tumor. If the disease goes on to any great extent, the original outline of the bone is lost, the soft parts are invaded, and one large cancerous tumor invades them all, as seen in this knee-joint.[3] These scapulæ,[4] you will see, are almost entirely destroyed by carcinomatous tumors, which grew from their surface. In the long bones, the disease appears to arise very commonly in the interior, and then continues along the bone to a greater extent than it reaches externally. In the skull, it is seen destroying the bone in like manner, so that when the soft structure of the cancer is removed a hole is left.

FIBROUS OR SCIRRHOUS CANCER.—It is more rare for a tough fibrous structure or matrix to accompany the cell growth and constitute a scirrhous cancer; but still this is sometimes seen, as in this head of the tibia;[5] the tumor is very hard, and consists of a dense fibrous structure containing cells in its meshes, but emits a little juice on pressure, and you see is not circumscribed, but has partly destroyed the head of the bone as well as the soft parts. In these two forms the disease returns after amputation, and in many of these examples was even associated with the same malady in other parts.

OSTEOID CANCER.—This is a rarer form of disease; its peculiarity being that it is an adventitious growth, which pervades the bone, and destroys it in like manner with cancer, and also affects the internal organs secondarily, but its structure, instead of being soft, is osseous. It may be a question whether it constitutes essentially a peculiar form of disease, or whether it be only cancer modified by its contact with bone. I think the latter is the true explanation: that the disposition to cancerous formation is present, but not in a very extreme degree, and that time is given for the change of its elements into bone, and that thus it is propagated like cancer, but is osseous in structure. You may ask how it varies from ordinary bone, which is innocent; and this I cannot well answer, as we have not had recently a fresh specimen for examination; but probably its matrix or some constituents would be found marking its alliance to cancer, and its difference from ordinary bone. In this very valuable specimen[1] you will see a number of white deposits in the head of tibia and condyles of femur as well as patella; and these are destroying the original texture, and involving all the healthy structures in the same way as cancer; indeed, in looking at this section at a distance, or at a drawing of it, you would think it to be cancer; it is only by a closer examination of the texture that you find it to consist of dense bone deposited in the cancellous structure. At the time of amputation this enlarged gland existed in the groin, and which was found on subsequent removal to consist of a mass of bone; and after death, which occurred soon, the lungs as you see here were also found to contain bony tumors. The whole progress of the case and its nature was one of cancer; only the cancer was ossified.

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[1] 1162^{12}, 1107^{22}.
[2] 1106^{5}.
[3] 1162^{45}.
[4] 1098^{15}.
[5] 1251^{85}.

CANCER OF THE SKULL.—I have already said that cancer may affect the skull like any other part, commencing in the structure and destroying both tables, until a hole is formed in it, as seen here.[2] This is one form of cancer; another and perhaps commoner is where the bone is affected secondarily to the dura mater, the cancer beginning on the surface of the membrane, and growing into and eroding the bone. It is an affection often met with as a secondary affection springing up after the removal of local disease, as in a limb or in a breast; and is often not suspected until the dura mater is separated from the skull after death, when small cancerous nodules are torn open, a part of them being left on dura mater and a part on the skull. They are clearly seen to spring from the membrane, and

[1] 1165^{50}.

[2] 1081^{45}.

afterwards penetrate the bone; they may even form a projection on the surface, as in this specimen.[1] There is a third form of cancer, which springs up primarily in the bone, is local and peculiar in character, and to which Lobstein has given the name of *osteolyosis*, or cancerous erosion. The disease begins in the diplöe of the bone, and proceeding outwards in all directions, an excavation is at last formed, and thus is produced the appearance you see in this skull, eroded in all parts. If seen at an early stage, the soft growth within the dipöe, having destroyed both tables, is seen projecting both externally and internally; and as often some fluid is present in the growth, a soft raised portion of periosteum is seen at the spot of disease; if this is punctured and the soft adventitious structure removed, a hole is left. In some places only one table is seen to be destroyed. This calvaria[2] is thus affected. You will see in it numerous holes, and also excavations on the inner surface. These parts were occupied by a reddish soft material, consisting of a fibrous matrix holding nucleated cells. The structure when examined reminded one of epithelial cancer, and its local nature makes it approach in character very much this form of disease. In the man from whom this calvaria came, there was no deposit elsewhere. This dried portion of os innominatum,[3] thus eroded, has probably been affected by a similar disease.

Cancer of the spine may be specially mentioned, because of the peculiarity that it becomes shortened by the disease. The new growth occurs in the substance of the vertebræ, and, being soft, it is squeezed out by the weight of the body, and so several of the intervertebral cartilages meet together, the cancer being around them.[4]

OSTEOSARCOMA.—This term has been used in a very general sense; but I think, although there are varieties of it, it may be pretty accurately defined. I have already told you that the cancerous diseases of bone, like cancer elsewhere, are characterized by their disposition to pervade and destroy all tissues near which they grow; but these osteosarcomatous tumors are limited or defined, although they may have a certain amount of malignancy. My own opinion is, that they are altogether comparable to the fibrous tumors of soft parts. These may be simple and innocent, or they may be fibro-plastic, or simply fibrous, and return, if removed, showing a certain malignant nature; or they may be propagated through the body as malignant fibroid. Now, if we suppose such tumors growing from bone, but containing certain osseous elements, osteosarcoma would be produced. These tumors consist then of a fibrous structure with varying proportions of bone and cartilage (probably never any myeloid, unless the interior of the bone has been involved), and, like the soft tumors already spoken of, are quite circumscribed, and do not involve the tissues; thus they grow from the surface of the bone, but do not affect it. A section shows the shaft of the bone passing quite through the tumor, the fibres of which spring from its surface and proceed outwards in all directions; they arise mostly from the ends of the bones, including the epiphyses in youth, and the tumors are longer than they are broad. When seen at an early period, the periosteum may be seen surrounding them, as if the growth sprung immediately from the bone. The latter, I say, is not involved; but owing to the chronic process which has been going on, has become indurated, the cancellous structure and medulla being changed into bone. The structure of the tumor consists essentially of fibres, as you see in this last specimen,[1] removed from a hospital patient; these are radiating outwards in all directions, constituting the fleshy or sarcomatous part of the tumor. About half of these fibres are undergoing ossification, and thus if the growth were macerated, and the soft part removed, you would observe a number of beautiful spiculæ proceeding from all around the surface of the bone: you will see several specimens on the shelves, prepared in this way. Besides this, you will perceive in this tumor a number of nodules of cartilage; and these you may always expect to find in growths near bone; they are scattered, as you see, through its substance. These three elements, fibre, cartilage, and bone, may be combined in different amounts; in this you see them all, in another[2] the cartilage predominates, and in a third[3] nearly the whole tumor has ossified. When very large, a softening may take place in the centre, involving the bone, as in large fibrous tumors. As regards their malignancy, I am under the impression that the more the disposition to change to bone or cartilage, the more local are they in character, until they assume simply the form of exostoses or enchondromata; and the more they are of a fibrous character, the more malignant: but this, again, depending upon the character of the fibre, as in the soft parts. In several of our specimens the disease returned as osteosarcoma in the lung,[4] that is, a tumor composed of fibre and bone: the former con-

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[1] 1081^{50}.

[2] 1081^{40}.

[3] 1132^{54}.

[4] 1028^{60}.

[1] 1251. [2] 1162^{94}. [3] 1162^{65}. [4] 1750^{90}.

sisting of fibre as seen in the malignant fibroid, and the latter consisting of true osseous structure.

Fibrous Tumors.—I have just told you that I believe these osteosarcomata are fibroid tumors ossifying, and therefore, if the growth be rapid and in an early stage, it may consist of nothing but fibre, as occurred in the case of a man, lately in the hospital, who had a fibrous tumor growing from his humerus. Here is a large fibrous tumor,[1] removed lately by Mr. Callaway, from the hand, and which appeared to arise from the bone. Similar growths may also be seen springing up in the lower jaw, and requiring the removal of part of that bone; and also in the upper jaw. Lately you saw a woman in the hospital who had had recurrent tumors removed repeatedly from the antrum; and the same from the orbit in a boy, in whom, however, they subsequently recurred and penetrated the brain.

Osseous Tumors.—It is difficult to separate these from exostoses, for, as I before said, although a tumor has a particular form and is circumscribed, whereas inflammatory product (which is osseous when near bone, and is an exostosis) is not defined; yet these distinctions cannot always be made. When, however, a circumscribed outgrowth of bone occurs, it may receive the name of bony tumor. Such may arise, I think, from a chronic inflammation; or occur, as we have already seen, from ossification of fibrous tumors. In this specimen[2] you will see a large bony growth which sprung up in the antrum, and spontaneously came away, an account of which was given many years ago by Mr. Hilton, in our "Reports."

Enchondroma.—The same remarks hold good of this form of growth as the last: it may constitute a tumor, or may merely be the accident of an inflammatory process near bone in the same way as an exostosis; thus in this specimen[3] of diseased joint you see, among other inflammatory products, large masses of cartilage at the edges. When a growth of cartilage is circumscribed, it constitutes a tumor. These are very common on the fingers, as numerous specimens in the museum show. Here is a very fine example[4] of a very large cartilaginous tumor growing round the upper part of shaft of thigh bone. It contains cysts filled with a glairy fluid, and might be called cysto-enchondroma. Here is a portion of an immense enchondroma[5] also containing large loculi, and which springs from the pelvis. In the remarkable case from which this was removed the cartilaginous tumor occupied the upper jaw,[6] and after

[1] 1124^{16}. [2] 1666^{43}. [3] 1886. [4] 1160^{80}. [5] 1132^{63}. [6] 1666^{32}.

growing nine years, was removed by Mr. Morgan; it sprouted forth again, so that at the patient's death, seven years after the operation, it had reached the immense size seen in this cast; such an example of enchondroma of the superior maxilla is very rare. In all these cases the disease was local; but I was lately reading a case in a French journal, of an enchondroma of scapula being associated with similar disease of the lungs.

MYELOID.—These tumors, as far as our present experience reaches, spring up in the interior of bone, and consist of similar elements which constitute the medulla in the fœtus, these elementary cells being again produced under a morbid process in adult life, form the tumors seen in these parts. As the growths are peculiar to bone formation, they do not, I think, occur apart from the human skeleton; and as far as I myself have seen, do not when simple, recur or become propagated.[1] The disease consists in the production, within the interior of the end of a bone, of a quantity of soft medullary matter, consisting of a structure no longer met with in any of the tissues of the adult, but from constituting the fœtal marrow, is termed *myeloid*. From some cause, may be an injury, an undue action is excited at the end of a bone, and a production of these peculiar cells takes place. Beginning in the centre, the growth continues until the shell of the bone is reached; this is gradually absorbed, and at length the periosteum is pushed before it and a tumor is formed; the latter at the same time becoming thickened and forming its investing membrane. As this process occurs near a joint, the disease reaches as far as this, and then ceases, and thus generally the cartilages are found perfect on the end of the tumor; on the opposite side, the jagged end of the bone is seen entering its middle, and connected with it by the periosteum, which passes off the shaft to form the sac. If this specimen[2] can be taken as an example of the disease as it occurs in youth, the epiphysis is not involved. When the tumor is examined after recourse has been had to amputation, it is seen to be quite round, and occupies the end of the bone, consisting of myeloid matter inclosed in a membranous sac continuous with periosteum, the cartilage and joint being perfect on one side, and the jagged end of the shaft entering the tumor at the other. If the tumor should be allowed to grow very large, the sac might give way, and the joint be involved, but this is rarely seen. There is a disposition in all cases for the sac to become osseous, or even form a complete bony case, as is seen in this myeloid tumor of scapula,[1] and this large bony cyst[2] (or spina ventosa[3] as it is called) of the head of the tibia, I believe to have been an ossified cyst of a myeloid tumor. In some, the myeloid matter is quite soft, so that if taken out, a mere sac is left, as seen in several specimens.[4] In others, processes of fibre proceed from the periosteum, split up into a reticulum, constituting a fibro-myeloid,[5] while in other tumors, cysts are present, and these may be called cysto-myeloid.[6] The material itself is quite peculiar, and can scarcely when once seen, fail to be again recognized. It is soft and dry, not at all fibrous, but breaks up like cancer, at the same time, is dry, and emits no juice, being of the consistence and general appearance of colored blanc mange: this color is very peculiar, and gives the tumor a red hue, hence the spleen-like tumors of older writers; it is somewhat like that of plum juice, and is different fron any other colored tissue in the body.[7] There is often some blood extravasated in the tumor, which may increase the redness, but when this is removed the myeloid matter itself is seen to have this morone hue. The microscope can immediately detect the peculiarity of the structure, exhibiting very large cells, which have branching processes proceeding outwards in all directions, and which apparently join one another. The cells are of various sizes, some of the largest holding as many as fifty nuclei, or more, of an oval shape and containing nucleoli.

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[1] Since these Lectures were given, a man has returned to the hospital from whom specimen No. 1268^{50} of myeloid disease of fibula was taken. The leg was amputated two years before, but small tumors recurred on the stump. These consisted of perfect myeloid matter, and some enclosed in bony cysts; and subsequently, on his death, perfect and simple myeloid tumors were found in his lungs.

[2] 1162^{32}.

In all the cases which I have seen of this disease, it has not returned,[8] but it may be mixed with other ingredients of a malignant kind. Thus you will see in this specimen,[9] a large tumor growing from the fibula, composed of a soft matter and bone; the former consists of a structure which can be called by no other name than cancer, but in parts there are nodules of myeloid matter. The lad from whom it came died some months after amputation, with the same disease in the lungs and the spine, and composed of the same three elements.

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[1] 1098^{5}.

[2] 1255.

[3] See remarks on which, G. H. R., series iii. vol. iii.

[4] 1162^{31}, 1160^{50}.

[5] 1162^{30}.

[6] 1255^{26}.

[7] See drawing, 5^{5}, and copy in G. H. Reports, series iii. vol. ii.

[8] See note at preceding page.

[9] 1268^{51}.

Epithelioma of Bone.—This is seldom seen except on tibia, and appears always to begin from the periosteum; the disease probably is generally the sequel of a chronic ulcer. The history generally is, that after a long-standing sore on the leg, and the several products of inflammation have for years been produced, that another morbid action is put on, that a cell growth takes the place of the other simpler elements; that this soon involves the skin and periosteum, and at last eats away the bone until the interior is opened, or even its posterior wall invaded. You thus see a bone occupied by this white crumbling matter, consisting of what is called epithelial cancer, and sprouting from the surface is a warty or cauliflower growth. If the limb is removed, the disease does not recur, and the patient quite recovers, the affection appearing altogether local.[1]

This is a specimen[2] of tibia showing *melanotic* tumor growing from the periosteum.

TUBERCLE IN BONE.

I have not a specimen to show you of this, for I believe it to be exceedingly rare; I should tell you that opinions vary greatly with respect to what constitutes tubercle in bone as well as in other organs. You know that about the character of miliary tubercle there is no dispute—a small, defined, hard granule; but, common as this is, it is rare compared to a yellow, soft, friable substance, which is found in all organs, and which is also called tubercle. It is thought by some that the small granules before mentioned soften into this other form, and thus the original character is lost. Others would say, when examining such yellow soft substance, that there being no proof of the previous existence of tubercles, such amorphous matter may be simply an inflammatory product undergoing decay; while a still more favorite opinion is an intermediate one, that the material has never existed in the form of true tubercle, but it is a crude inflammatory product, imperfectly organized on account of the scrofulous diathesis of the patient. Thus a lung which one person calls tuberculous, another would call scrofulo-pneumonic. The same difficulty occurs in bone. It was once generally taught, and even now by some, that in those slow painless affections of the joints in scrofulous children, where the ends of the bones are apparently much enlarged, that the disease commences as a deposit of tubercle in the end of the bone; that this softens, and suppuration occurs in the cancellous structure, until at last the joint itself becomes involved. I have had the opportunity of examining several of such joints, and have never yet met with a good specimen of tubercle; that is, with a material breaking up into a number of small granules which might unequivocally be called tubercles; but the cancellous structure may be found infiltrated with a yellow amorphous matter, which is either an ordinary inflammatory product undergoing degeneration, or at most a product less organized from its occurrence in a scrofulous person. There being in so many cases a doubt as to a material of this kind being genuine tubercle; there is an equal uncertainty as to whether the disease commences in the bone at all, whether indeed the ends of the bones are not affected secondarily; in fact, my own opinion is, that many of these diseases do begin in the synovial membrane, as in other classes of persons, but the inflammation is slow, and peculiar, owing to the scrofulous disposition. A very favorite seat for this chronic inflammatory process is the head of the tibia, as also it is for the deposition of tubercles when they occur. I should call only that an unequivocal specimen where the joint was not yet involved, and where the deposit was tolerably circumscribed, and when examined, could be broken up into a number of distinct granules or tubercles.

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[1] 1248^{55}, and another.

[2] 1257^{30}.

HYDATID.

Hydatid in bone is very rare. It is occasionally met with in the long bones, and more especially in the tibia. I may here remark that the bones most exposed are those most liable to disease and injury of all kinds; and thus affections of the bones and joints of the lower extremities are exceedingly more frequent than those of the upper; and the parts of these also most exposed are most liable: as the tibia, clavicle, or os frontis, to inflammatory processes. So the tibia is the bone in which hydatid is most frequently found, though it is a rare affection. In this preparation[1] you will see the head of the bone containing a cyst or an echinococcus, and holding numerous smaller ones within it.

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[1] 1258.

BLOOD TUMORS.

Cysts containing blood have, I believe, been occasionally met with in bone.

Osteoaneurism.—Pulsating tumors of bone have been described as consisting of a congeries of bloodvessels, or of a vascular network like a nævus or cancerous tissue in the soft parts. I have never seen a case of this kind, and know them to be rare; and I am of the opinion that most pulsating tumors of bone resemble one that was in the hospital a few years ago, where the patient, a man, had a large carcinomatous growth springing from the walls of the pelvis, and from this containing very large bloodvessels, it had a very distinct pulsation.

Cephalhæmatoma is the name given to those blood tumors which occasionally arise on the heads of children at time of birth. I do not allude to the scalp tumors, which are more common,[1] but to effusions of blood which take place beneath the periosteum, and which is a rarer affection. The blood may be absorbed, but sometimes it breaks out externally, leading to a slough; or it may involve the bone and penetrate the brain, leading to death.

This last affection reminds me that in *scurvy* the blood is poured out, often in large quantities, beneath the periosteum, and that this subsequently hardens, and even becomes vascular; thus Busk has succeeded in injecting such a mass from the vessels of the bone.

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[1] 1635^{45}.

DISEASES AND INJURIES OF JOINTS, TENDONS, MUSCLES, &c.

- Inflammation
  - Synovial membrane.
    - Acute ....
      - Simple and traumatic.
      - Purulent, pyæmic, and gonorrhœal.
      - Rheumatic.
    - Chronic...
      - Effusion, or hydrops.
      - Pulpy thickening.
      - Scrofulous inflammation.
  - Cartilage.. Ulceration?
    - Various degenerative changes.
  - Articular ends of bone
    - Acute from injury or scrofula.
    - Chronic and ivory changes.

Injury...... Synovial membrane, cartilage.

Chronic Rheumatic Arthritis.

Gouty Deposits.

Dislocation.

Ankylosis and Synostosis.

Adventitious Growths and loose Cartilages.

INTERVERTEBRAL CARTILAGES.

SHEATHS OF TENDONS, AND BURSÆ.

TENDONS.

MUSCLES.

Malformation. Excess, deficiency.

Injury.

Inflammation.

Atrophy and Degeneration.

- Adventitious Growths..
  - Cancer.
  - Tubercle.
  - Fibrous nodules.
  - Parasites; trichina, cysticercus.

JOINTS.

I shall only briefly run through this section, as the whole subject is given in the surgical lectures. The joints are composed of the articular extremities of the bone, which are cancellous, and covered by a more compact layer of osseous tissue; this, again, has over it the articular cartilage, and the two ends are connected by a capsular ligament, lined by a synovial membrane. Opinions vary as to whether this membrane terminates at the edge of the cartilage or is carried over it; but I believe, in the adult, it ceases at the cartilage, the cells which are seen on the latter being its own superficial layer, and not those of a distinct membrane. The synovial membrane consists of a delicate vascular tissue, covered with epithelium, and from the surface of which there hang down a number of vascular fringes, which become enlarged under certain morbid conditions.

SYNOVIAL MEMBRANE.—*Acute Inflammation.*—For the sake of classification, the distinctions into the various forms of inflammation, and into acute and chronic, are made; but in particular cases it is often difficult thus to distinguish. The changes which go on in the synovial membrane are very similar to those witnessed in other serous surfaces—an acute process accompanied by effusion of lymph or pus; or a more chronic process accompanied by a simple serous effusion, or by the production of more solid material. *Simple synovitis* is seen best after an injury where the ordinary symptoms and signs of inflammation exist, with swelling and effusion into the joint, and which may subside again in a few days. If the joint can be inspected at this time, there will be found great vascularity of the membrane, with increased serous effusion, and, probably, some flakes of lymph; the latter will be seen covering the synovial membrane, but not the cartilage, except in young subjects, where I have been able to detect a distinct layer of lymph, having the part below highly vascular.

PURULENT, PYÆMIC, AND GONORRHŒAL INFLAMMATION. — In many forms of disease of the joint suppuration may occur; thus in the case of injury just mentioned, an acute suppuration is very likely to happen. In most cases however, of suppuration, the disease is chronic, and the cartilages and other parts are involved. Unless from injury, the more acute forms are seen in connection with pyæmia, or when an abscess in the neighbourhood of a joint breaks into it and involves it in the same suppurative process. In pyæmia a dirty thin pus may be found in the joint after it has been affected for only two or three days: but with this there is no destruction of tissue, the synovial membrane is only found somewhat more vascular; if, however, the patient live, a destruction of the joint would very rapidly ensue. The *gonorrhœal* rheumatism is rather a subacute form of a pyæmic inflammation. I mention it here in connection with pyæmia not because pus is formed, for this I think is very rare, but because I think it owns a similar cause. It is only fair to state to you that opinions vary much as to the existence of this form of disease; but my own experience leads me to the conclusion of its frequency, and this is supported by the fact, that I believe similar affections of the joints may be witnessed in women and other persons who are suffering from purulent discharges. The gonorrhœal rheumatism is characterized by a subacute inflammation, affecting sometimes the knee and larger joints, but more especially the wrist and ancle, more commonly the latter; and when I speak of this, I mean not only the true ancle joint, but all the smaller joints of tarsus in the neighbourhood; these deep-seated joints, with the ligaments, become affected, and a very chronic painful disease is the result, productive of a thickening and induration of all the articular tissues.

Rheumatic Affection of the Joints.—I place this on the list in order to make it complete, as it is by far the most frequent affection of the joints observed in the living, although the rarest in the dead. I have only had the opportunity in two or three cases of examining a rheumatic joint, and then the difference in appearance from a healthy one was so slight, that it was scarcely noticeable; indeed it would probably have not been recognized unless a minute examination had been made; the only appearance observed being a slight increase of fluid, the hyperæmic condition of synovial membrane, which, no doubt, had existed during life, was now gone. If you remember how fleeting is the pain and swelling of the joints, that a part affected acutely at one moment may in a few hours be quite well, you will perceive the reason why no structural change would be manifested.

Chronic Inflammation.—*Effusion.*—As in the pleura we may meet with a chronic effusion of serum, without any attendant symptoms dependent on a morbid (though unappreciable) state of the serous membrane, so a similar process may occur in a joint, whereby a large secretion of fluid and swelling of the joint take place, producing the affection known as *hydrops articuli*.

A still more chronic process, of a different character, whereby a solid effusion is poured out, and the membrane altered in character, constitutes the *pulpy degeneration* of Brodie. In speaking of the periosteum, I said that when an exudation occurs from a membrane and into it, the membrane itself becomes altered and incorporated with the new material; and so here, by a slow production of lymph from the synovial sac, it becomes swollen, soft, and so changed in form, that from being a thin tissue, it becomes a soft and thick one, and then, as the process still continues, it grows thicker and thicker, until this pulpy membrane is produced. I use the word *growth* advisedly, for when the synovial membrane has become vascular, and it is seen to be gradually increasing in thickness, the process is more allied to a growth, than organization of previously effused lymph. The joint becomes much enlarged and soft, and the disease can be easily detected by the *tactus eruditus* of the surgeon. Although the affection in its simplicity may be looked upon as a special particular form of disease, I believe lesser conditions may be constantly met with in various morbid states of the joint. Thus in severe cases of diseased cartilage the synovial membrane may be found converted into a similar pulpy gelatinous state.

Another chronic condition of the synovial membrane is where a number of vascular fringes hang down into the joint; these appear to be enlargements of the natural fringes described by Rainey. If you look at these various specimens of disease of knee joint, you will observe this condition, as well as in some others to which I have already alluded.

SCROFULOUS INFLAMMATION.—The remarks I have already made in reference to tubercle in bone, will prepare you for the difficulty of knowing what is exactly understood by scrofulous affection of joints. As I said in the last lecture, the old opinion was, that tubercle formed in the bone then softened, and set up mischief in the neighbouring joint. There is no proof, however, that this is generally the case, but rather that a synovitis occurs in scrofulous children as in adults, but is of a slow nature, and the articular ends of the bones become involved in the inflammation. When the so-called scrofulous joints of children are examined, they will be found, in all probability, completely disorganized, there being evidence of a former chronic synovitis and destruction of cartilage; the ends of the bones will show no tubercle, and in many cases not even an unorganizable lymph before spoken of, but simply a softened state of the cancellous structure, with the tissue infiltrated with a gelatinous red matter; the bone, being very soft and readily cut with a knife: it may be, however, that such morbid condition preceded the affection of the joint.

CARTILAGE.—I use the heading inflammation and ulceration, because formerly the changes which occurred in cartilage were considered due to these processes, and even now we must necessarily associate the changes with them. Although we do not yet accurately define the term *inflammation*, and probably use the expression in many cases erroneously, yet we have a knowledge of the process within certain limits. We understand, for example, that the bloodvessels of the part are altered; that they are distended, or in a hyperæmic condition, and that certain exudations, as lymph, take place from them, and that a certain slow process of disintegration occurs, known as ulceration. Now, since cartilage is not vascular, and these exudations are not observed, the mere loss of substance so often witnessed in cartilage cannot be called by the name *ulceration*, a term always implying an inflammatory process. It is for this reason I call the destruction of the vertebræ by aneurism, atrophy, and not ulceration. The so-called ulceration, therefore, must depend on other causes, and must receive another name. Articular cartilage, you may remember, consists of a number of cells contained in a matrix of hyaline tissue, and is supplied with nutriment for its growth from a plasma afforded by the synovial membrane around it, and the articular end of bone on which it rests. The looped bloodvessels in the bone supply a pabulum for the non-vascular structure beyond. The cartilage thus depending on the surrounding structures, and especially the bone, for its nourishment, must be affected by whatever affects them; as, for example, if the end of the bone is inflamed and an exudation occurs, the cartilage will come off in large flakes. Some years ago, Mr. Key, being dissatisfied with the ordinary explanation, that the so-called ulceration of cartilage was due to an absorption (for, according to the theory of that day, all loss of substance was due to overaction of the absorbent vessels), studied the subject afresh, and found that in these cases the synovial membrane was generally also involved; that it had been subject to an inflammation; that an exudation of lymph had taken place, which had organized, and that the vascular fringes so formed were everywhere in contact with the affected cartilage; he supposed, therefore, that an absorption took place through these vascular fringes (experiments had then proved that the bloodvessels could absorb). I consider that in this theory there is a good deal of truth; for although of late we have been told that a cell growth is a sufficient explanation for the change (Goodsir), and still more recently, and with more reason, that the changes are simply degenerative, yet I believe in many cases this alteration in the synovial membrane does act in the way Key ascertained. It may be that an inflamed synovial membrane does not act thus on a purely healthy cartilage, for while the inflammation is proceeding, no doubt certain alterations in the vitality of the cartilage are also taking place; but let us look at what happens in synovitis of a not very acute character. An exudation is formed on the membrane and into it, so that a mere pulpy gelatinous material is seen. This process continues, and if an opportunity be afforded of examining the joint, we see in the interior a distinct lining of this gelatinous lymph, and in scraping it off we come immediately in contact with the bone, the cartilage being everywhere destroyed. In such a case, clearly from the effects of a synovitis, the cartilage may be absorbed or destroyed. In some cases it is impossible to say that the inflammation of adjacent bone has not contributed to the result, and in very many cases it is undoubtedly so; but if so, there are generally distinct flakes of loose cartilage to prove it; but in the cases of which I speak, there is no appearance of affection of the bone. Should there be an inflammation of the articular ends of the bone, an exudation is poured out, granulation forms on the surface, and the cartilage is thrown off in flakes, as in this specimen, where disease of the head of the tibia subsequently involved the joint, and a probe passed through a fistula in the bone could completely lift up the articular cartilages of the knee. In the case of which I previously spoke, no cartilage is seen, and no marked affection of the bone, and the former, therefore, must have been removed by absorption.

Although the cartilage may be dependent on the surrounding structures for its nutrition, it does not follow that appreciable changes need be present in them whenever it is found altered; for in analogous changes in other organs, as the heart, although a fatty degeneration is constantly associated with ossification of the coronary arteries, yet this may occur without any such manifest disease of the bloodvessels. We nevertheless, in such case, still attribute the change to a faulty nutrition, although we can only study the visible effect. Of the same kind are the changes in the cartilage which we are forced to call primary, and generally described under ulceration; and it is to this that many observers have of late directed their attention; and more particularly Redfern, who was among the first to describe the degenerative changes that occur in the so-called ulcer. These I have constantly seen, and which you may all verify for yourselves. You see the cartilage cells becoming altered, at first perhaps enlarged, but soon broken up into large numbers, with a loss of nuclei, until the cells are filled with a mass of granules, which may then burst forth and be dispersed through the hyaline substance; the latter, at the same time, is undergoing a change: it in part disappears, and in part breaks up into a distinctly fibrous tissue. My colleague, Mr. Bryant, speaks of *fatty*, *granular*, and *fibrous* degeneration of cartilage, according as the degeneration assumes any of these characters. The various outward appearances of the changes you will have described to you elsewhere, some appearing like mere excavations, others having a villous or shaggy surface, &c.

ARTICULAR ENDS OF BONES.—Many diseases of joints may commence here, and in all extreme forms of articular affections they are of necessity involved. I have already said that it has been generally taught that the so-called white swellings, or scrofulous diseases of joints, in children begin with a deposit of tubercle in the bone, which subsequently softens and involves the joint; this, I think, is rare, but it is no doubt true that the ends of the bones are seriously involved in such cases, but it is a question very often whether this is primary or secondary—whether, in fact, the affection may not begin often in the joint, and the bone be only associated in the inflammatory process. It is probable, however, that in many cases the disease may have its seat here; the ends of the bones being somewhat enlarged, and filled with a red gelatinous matter; they are soft, vascular, sometimes fatty, and can be cut with a knife. Such a condition being very like what is found in the bones of scrofulous children, without the presence of distinct tubercles, it is probable that the affection is of a like kind, and may sometimes be primary. In other cases of diseases of joints, as in adults, arising from whatever causes, the articular ends are generally affected: thus in acute disease of the joint, the articular ends participate; they are found, when cut, very soft, and highly vascular, and containing a lymph or albuminous fluid in the cancellous structure. In slower diseases of the joint, after the cartilage is removed, the bone becomes ulcerated, and disintegrates or becomes necrosed, so that large portions come away, and at the same time a new production of bone is taking place on the surface; so that you see in these articular ends of the knee joint large portions of new bone around them, and so in several others of these specimens. You will witness in the hospital many cases of a converse character, where disease of the joint follows an affection of the bone, especially in the case of the knee, for a very favourite seat of disease is the head of the tibia, arising from injury or other cause. A suppuration and local necrosis is very apt to arise, and then, unless a cure occurs, the joint may become affected. The changes which take place in different joints vary: thus in the hip they are often very considerable; the head and part of neck may be destroyed as well as acetabulum, or a rapid necrosis may take place, involving all these parts.[1]

EBURNATION.—*Ivory or Porcellanous Changes.*—In some chronic diseases of the joint, where the bone has become carious, and all action has ceased, so that the patient is able to move his limb, any remaining portions of the articular surface rub against one another, and become highly polished. Thus in this diseased joint, which is partly destroyed and excavated, several raised portions of bone may be seen having these polished surfaces. These are sometimes spoken of as eburnated cartilage, but there is no trace of cartilage to be seen in them; they are rather portions of indurated bone. When examined they often present no structure, but a mere trace of the original osseous tissue. In the disease called chronic rheumatic arthritis you will see the whole articular surface thus affected.

WOUNDS OF JOINTS, &c.—These are constantly treated by the surgeon, and get well under judicious management, though often attended with serious results. The synovial membrane again closes by a fibro-cellular tissue; but the cartilage is not replaced by new tissue, but by one simply fibrous. You will see in these two or three specimens of fissures in joints that a fibrous tissue connects them.

As I am speaking of injuries, I may here mention that in lesions of all cartilages the union is never by new cartilage cells, but by

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[1] The various diseases of the joints are so numerous that I do not mention any special preparation.

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fibrous tissue. In fractures of *costal cartilage* the union is by fibre, which, as the patient advances in life, may ossify. Such injuries are rare, but the few instances in museums exemplify union by bone. The same occurs in the laryngeal cartilage; a fibrous union, with occasional subsequent ossification.

Intervertebral Substance.—I have already said that in many cases of caries of the spine the disease begins in the intervertebral substance. *Softening* may be constantly observed in persons who have been long bedridden. By thrusting the point of a scalpel in between the vertebræ, the elasticity is found to be lost, and, if microscopically examined, the cells are found to have undergone a fatty degeneration. The fibrous tissue is seen dotted with granules, and the cells between, filled with fat globules.

CHRONIC RHEUMATIC ARTHRITIS.

This is a form of disease not much recognized in the living subject, though long known on dissection as affecting the hip joint in old men, and called *malum coxæ senile*. For this reason I will enter into a few details concerning it. Our museum contains numerous admirable examples of this, as well as of the same affection in the shoulder, elbow, and other joints. There is no reason, I believe, to connect the disease with rheumatism, the latter term having been vaguely used in connection with every variety of articular affection. It is essentially a chronic disease, occurring mostly in advanced age, in which the natural textures of the joint are destroyed, and other products of a low character are produced; changes, indeed, which occur in a more rapid manner in acute affections of the joint, and therefore I think the simple term chronic arthritis would be preferable. In acute disease of the joint the synovial membrane is changed, perhaps thickened by lymph, the cartilage is destroyed, the bone is carious, and new osseous tissue is produced. Similar changes, but of a slower character, take place in this disease. The joint at first glance is seen to be much distorted, the great peculiarity being that a quantity of new bone is seen growing all around the articulation, as well as distinct pieces in the capsular ligament. At the same time, the cartilage is destroyed, and the ends of the bones have become highly polished and altered in shape. An appearance is produced as if a process of this kind had been followed,—that a joint had been taken, the cartilages removed, and a quantity of soft osseous material had been placed within them, and the ends squeezed together; the bony material would necessarily arrange itself around the edges of the articular ends and then harden, while the surfaces themselves, being dry and rubbed together, would receive a polish. If to this be added a thickening of the capsular ligament, a general idea is conveyed to you of the character of the disease. The affection appears to begin in the capsule by a chronic inflammation, whereby it becomes thickened, and afterwards a deposit of bone occurs in the joint.

In these specimens of hip disease[1] you will see a rim of new bone formed around the edge of the acetabulum, whereby it is enlarged and deepened, these new portions being polished on their inner surface; at the same time, all around the head of the bone there is a rim of new osseous material, giving it a large expanded surface, with an edge of bone passing back over the cervix to the trochanters; it thus assumes a mushroom shape, and the neck is consequently obscured, and in many cases, shortened. At the same time the cartilages have gradually been absorbed, and the ligamentum teres destroyed. By the large flattened head and the expanded acetabulum meeting and rubbing together, a polish is obtained. The acetabulum is not uniform, for the new bone produces numerous elevations and depressions, the former only become polished, being those parts which come in contact; also you will see distinct portions of bone in the capsular ligament.

In the *shoulder* the disease has the same characters as you see in these specimens;[2] the head of the humerus is quite altered, for instead of being round, it is converted by new bone into a large irregular mass, having a polished oval surface on one side, where it meets the glenoid cavity; and also, if much enlarged, it has another above, where it meets the under surface of the acromion; and sometimes even a third, to meet the clavicle. The glenoid cavity is expanded and flattened, but generally with not much new bone around it; as, probably, the greater motion compared with the hip prevents it; but in the capsular ligament there is some bony deposit; the under surface of acromion is polished to meet the humerus, and this often is detached, so that it is often difficult to say whether it is the epiphysis separated, or a fresh development of bone; that is, as you see here,[3] there is a distinct square portion of bone attached

[1] 1131^{33}, 1131^{50}, &c.

[2] 1295^{35}, 1100^{45}, &c.

[3] 1298^{60}.

to end of acromion by ligamentous structure, and appearing exactly as if the point of this process had been broken off. I wish particularly to draw your attention to this, because only the other day this specimen was sent to me as one of fracture of the acromion, and which exhibits nothing more than an example of chronic rheumatic arthritis; and, formerly, two or three other specimens in the museum were labelled as fractures. The cartilages are always destroyed, and articular ends of bone become polished or eburnated, and just as the ligamentum teres in the hip is altogether lost, so the long tendon of the biceps is often destroyed; and, as a consequence, the head may become dislocated; then it is that an examination of a joint, after death, may leave a doubt as to whether the luxation has been the result of disease, or whether an injury in the first place did not set up the latter. In many cases of supposed dislocation, there can be no doubt that the case is one simply of disease; but, at the same time, this affection may be caused by injury, as some of our specimens show; though it is doubtful whether the dislocation occurred at that time, or the result of subsequent changes.

In the *elbow* the disease is of a similar kind[1] as in other joints, the cartilages are gone, the ends are polished, a quantity of new bone is seen surrounding the head of the radius, along the edges of acromion and coronoid process, and also in front and back of condyles of humerus. In this specimen these elevated ridges could be felt during life, and caused impaired motion, which must not be mistaken for ankylosis, which never occurs in this disease. In the capuslar ligament also there are separate portions of bone.

In these two specimens[2] you will see in fossa of olecranon small bones or ossicles; but whether due to this form of disease I cannot say, as there seems no affection of the joint.

In the *knee* also the same changes occur; rims of new bone form along the edges of the condyle and around, producing large detached masses. The same also in *phalangeal joints* of hands and feet.

In the *vertebræ* you may see, as in some of these specimens,[3] a similar form of disease; new bone being formed along the edges of the bodies, which thus overlap each other, and the articular surfaces are expanded and polished. In these *pelves*,[4] also, you will see a chronic affection of the joint resulting in a deposition of bone around the edges of the sacro-iliac and pubic articulations.

[1] 1303^{25}, ^{30}, 1305. [2] 1298^{75}, ^{77}. [3] 1007^{5}. [4] 1128.

GOUTY DEPOSITS.

This preparation[1] of knee joint shows what often occurs in gout; you will see the whole surface, condyles, patella, and tibia, covered with a white mortar-like matter, which Dr. Rees states to be urate of soda.

DISLOCATION.

This is fully treated of in the surgical lectures; and therefore I will merely refer to our specimens, showing new sockets in unreduced luxations, and warn you to be careful in not confounding a simple dislocation and its supposed results, with dislocation the consequence of disease, as has often been done in the case of hip and shoulder. I may inform you that now and then you may meet with the affection known as congenital dislocation of the hip joint. The child walks with a rolling gait, and it is found that the head of the thigh bone constantly falls out of its socket. This is owing to a badly formed acetabulum, or absence of the ligamentum teres, or may be, its lengthening. It is possible that it may be due to a disease in fœtal life, as already seen in the sacro-iliac synchondrosis of the oblique pelvis; but of this there is no proof. You sometimes meet with persons who are constantly having a particular joint dislocated; this probably arises from injury in the first place. This head of a femur[2] came from a woman who had had her thigh dislocated twenty-two times; the ligamentum teres is quite destroyed. Dislocation occurs from *disease*. Thus in the hip, the head of the bone, or remains of it, slip out of the socket on to the dorsum of the ilium. In the knee, when all the ligaments are destroyed, the bones slip out of place, and, like those of the hip, take a definite direction. The femur is thrown inwards, so that the outer condyle rests on the middle or inner surface of the tibia, and the patella becomes attached to the front of the outer condyle.

Dislocation of cartilage sometimes occurs, as partial detachment of semilunar in the knee.

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[1] 1327^{50}.

[2] 1321^{48}.

ANKYLOSIS AND SYNOSTOSIS.

This is a term which was formerly used as synonymous with stiff joint, originally implying that the joint was bent at an angle. Now we separate a stiff joint into two kinds—that dependent on a mere ligamentous union between the ends of the bone, and that where the union is altogether by bone; the former is called ankylosis, and the latter synostosis; what is called false ankylosis, is mere immobility of a joint dependent on a stiffness of the parts external to it. The synostosis may generally be looked upon as a further stage of ankylosis, and requiring greater destruction of the joint; for if any cartilage be left when the disease ceases, or even if the articular end of the bone be in its full integrity, the union is merely by fibrous tissue; in such a case some motion is still left. Where a good bony union is formed, the disease, probably, runs such a course as I described in speaking of destruction of cartilage. The synovial membrane is replaced by a soft gelatinous matter, and at the same time the cartilage is disappearing, so that an examination of the joint shows the ends of the bones covered with soft material; and as the ends of the bones themselves have no doubt been participating in the change, a slight disintegration of the whole surface has taken place; from this an exudation has occurred which has changed into vascular granulations; and now, if all morbid action ceases, ossification takes place, and the two surfaces are united. In some cases of synostosis, it is probable that the union has not been completed in this simple way, but that new bone has taken the place of the original shafts, and the part corresponding to the joint is formed from one piece. This specimen of ankylosis of the elbow does not show any traces of the original bones, but the massive piece forming the angle seems altogether new. In other cases, however, you can clearly trace the outline of the original bone; in this one, the head of the radius has remained free, while in these it is ankylosed in front, or in a state of pronation. In the knee both ligamentous and bony ankylosis may be met with, as also in the hip; in the latter, you may often trace, as you see here, the irregular outline of the previous diseased acetabulum fitted to the irregular process formed from the neck of the bone, the head having been lost. In the ancle and wrist, including tarsal and carpal joints, you will see by these several preparations that the most perfect bony union may occur.

A remarkable disposition to ankylosis is seen in this preparation,[1] showing the bones of the spine, pelvis, and lower limbs all united; there being an evident inclination throughout the body to a destruction of the joints, and a running together of the whole bony skeleton. This is a remarkable specimen[2] of a skull of a black man, showing ankylosis of the lower jaw.

ADVENTITIOUS GROWTHS AND LOOSE CARTILAGES.

I have already shown you that the inside of joints under inflammation present fringe-like processes hanging down into it; occasionally, by a more chronic process, some of these become very large and pedunculated. A more local process of the same kind may cause the production of only one or two such bodies, which may then grow to a considerable size and become detached; thus are probably formed loose cartilages, of which these are specimens.[3] One you see is as large as a florin, while others are smaller. They are flat, white, and smooth on the surface, although having numerous depressions. Their structure is fibro-cartilage, the cartilaginous elements being in small proportion, or altogether absent in some; one of these you will see contains a little bony deposit.

SHEATHS OF TENDONS, BURSÆ, &c.

The *sheaths of tendons* may be affected in many ways, like the joints and serous membranes. They may inflame and produce the various ordinary products, or, by a slower process, a large quantity of serum may collect within them. Thus pouches may form containing fluid, or distinct cysts grow from them constituting ganglia, as you see in this preparation.[4] A chronic inflammation may also produce those fringe-like and pedunculated bodies[5] already spoken of in the joints, and if these become detached they fill the ganglion with hundreds of small oval bodies like melon seeds.[6]

Bursæ are serous sacs to protect prominent parts, and they form where any undue pressure is exerted, as on tuberosity of ischium, on the toes from tight boots, over the vertebra prominens in deal porters, and more especially over the patella. They undergo similar morbid changes to those already spoken of, but not in so regular a manner as serous surfaces, seeing their lining membrane is not so perfect. The sac may become filled with a large quantity of serum, or by a chronic inflammatory process, a lymph shall be thrown out which shall organize until the whole sac is converted into a solid tumor;[1] although the centre is generally then filled with a soft lymph or serous fluid. Sometimes, by a similar process, the lymph may form bands, which may be seen passing across the bursa, which become at last like hard tendinous cords;[2] or they may be covered with shaggy tufts or pedunculated bodies, as seen in the joints,[3] or filled with melon-seed bodies.[4]

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[1] 1007^{35}.
[2] 1070.
[3] 1344^{20}, and following preparations.
[4] 1377^{50}.
[5] 1364.
[6] 1364^{50}.

TENDONS.

Tendons may undergo *inflammatory* changes, be found covered with lymph, granulations, or ulcerate and slough like other parts; these processes are seen especially in thecal abscesses in the hands. In *injury* their toughness is exhibited by their often resisting the most violent force, and separating rather at the attachment to the muscle; you will see in these specimens how, when fingers were torn off, their tendons were drawn quite out of the arm. In burns or sloughing wounds, or removal of a part by gangrene, you still see them holding on the dead portion. The parts where *rupture* from violence mostly occurs, are the ligamentum patellæ, tendo achillis, &c. After *division* of a tendon by the knife, a perfect union may again result; a lymph is thrown out, which rapidly organizes into a fibrous tissue, and unites the ends together by the same structure as before. In this specimen of tendo achillis,[5] you will see a soft material joining together the divided ends after twelve days; the microscope showed well-formed nucleated fibres lying together in bundles, and some free nuclei amongst them, as you see in this drawing. You may occasionally meet with *malformation* of tendons, as in these specimens[6] of triceps muscle, where one has an extra head, and the other is deficient. *Ossification* of tendons sometimes occurs,[7] and it has been stated that cartilage may sometimes be found in them. I will merely allude to *clubfoot*, which is especially a surgical subject; and you will learn elsewhere the different varieties. I may merely mention that opinions differ as to its cause, whether due to a contraction of the limbs from some irregular position of the fœtus in utero, or whether due to a subsequent contraction of the muscles, arising from a nervous cause in brain or spinal marrow. As numerous examples of the disease are seen to arise subsequent to birth, and others appear at birth, there can be no doubt that both explanations are correct. That it comes on after birth every one knows, and its association with spinal affection has often been noticed in reference to its coexistence with spina bifida, which so generally involves the nerves; we saw an example of this only the other day in the case of the man from whom Mr. Birkett removed this clubfoot: he is also the subject of spina bifida.[1] Adventitious growths may spring from tendons. *Fibrous tumor* I have seen removed; and I have seen a *cancer* taken from the hand which was said to arise from a tendon, but of this I am not sure.

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[1] 1375^{60}.
[2] 1374^{80}.
[3] 1375^{25}, &c.
[4] 1375^{70}, 1364^{12}.
[5] 1376^{5}.
[6] 1361^{55}, ^{57}.
[7] 1361^{60}.

MUSCLE.

Malformation.—Extra muscles occur under certain fixed conditions, and are pointed out by anatomists. They may be sometimes absent, as in a case[2] which occurred here several years ago, where the pectoral and adjacent muscles were wanting.

Injury.—When muscle is destroyed, it is never repaired by the same tissue, but by a fibrous structure; which, if the muscle be put to much use, becomes of the consistence of ligament. *Spontaneous rupture* may occur from violent spasm, as in tetanus, of which Mr. Curling has given many examples. I have seen the rectus abdominis thus torn; but rupture in these cases is more common, I think, in the muscles of the back, where you will often find laceration and effusion of blood.

Inflammation, attended with the usual results, as suppuration, gangrene, &c. Long before the muscular tissue itself is involved, suppuration may proceed in the cellular tissue amongst it. The effects of chronic inflammation I shall presently speak of, under degeneration.

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[1] His subsequent death showed a cured spina bifida, the opening leading from the sac into the spine being closed.

[2] Mr. Poland, G. H. Reports, series i. vol. vi.

Atrophy and Degeneration.—These are chronic processes, and mostly of a fatty and fibrous kind. I shall in the next lecture allude to these changes in the muscle of the heart, where they are all-important. As in the heart the fatty change is mostly a degeneration, and occurring in old people, and the fibrous very frequently the result of an inflammation, so the same obtains in the voluntary muscles; the only difference being that the latter change is more frequently the result of inflammation in the voluntary muscle, while in the heart it may be only a simple degeneration. A *fatty muscle* has lost its redness, is pale or yellowish, and, instead of being firm, is easily lacerable, or has a pasty feel; and in the heart, where another variety is seen, the fatty change produces a mottled appearance. The microscope shows the change which has occurred, for instead of presenting well-formed fibrillæ, with the usual transverse marking, these are now filled with granules of fat. Such changes are often met with in the voluntary muscles of old people, particularly of those long bedridden, and also not uncommonly in the bodies of those in our dissecting-room, who have come from the workhouses, and lived long on farinaceous food. Thus you may see a whole muscle like the pectoral changed into fat, or in another case only streaked with fat; though even here the intervening red portions, when microscopically examined, may be found to be undergoing the same change. The *fibroid* change is chronic, and may in many instances be called degeneration, but generally we witness it as a result of inflammation; thus in the neighbourhood of a diseased joint, as in long-standing hip disease, where there is much inflammation and lymph effused, the adjacent muscles will be found converted into a tough, white, translucent substance, a careful examination of which will show only here and there some muscular fibre mixed with this new tissue. In parts less changed you will be able to meet with fibrillæ, where one end is healthy and the other changed into fibrous tissue, and these imperceptibly pass one into the other. In other places nuclei may be seen, which shows that the new material arose in an inflammatory lymph. This condition is generally found in the hard white structure, taking the place of the muscles around such a joint; by careful examination the remains of the muscular fibres may be seen, by the linear arrangement; but the structure is simply fibrous, and sprinkled with nuclei. In the so-called progressive muscular atrophy, where the muscle wastes, causing paralysis of the limbs, it is still a question whether the affection is primarily one of the muscle, or secondary to the loss of nervous influence from disease of the spinal nerves.

Tubercle in muscle is very rare, and I have no specimen to show you.

Cancer is not unfrequently met with in the muscles surrounding cancerous tumors, as in the pectoral muscles around carcinoma mammæ, but I think it is rare as primary disease, except in the tongue. It is probable, however, that it may propagate rapidly in the course of the fibrillæ of the muscles, for it is very certain that if the muscles be examined around a spreading cancerous tumor, nucleated cells may be found in parts which are apparently healthy to the naked eye, and these are always appreciable with facility, but more especially in the tongue can they be discerned, because the cells and nuclei are of large size, and often contained in compound cells, the cancer being of that kind which is called epithelial: in such a case very often, if the muscle be examined for some distance around the disease, these large cells may be met with in the course of the fibres; a microscopic sketch of which you will here see. In the tongue, I say, the cancer being of this epithelial variety, is local, and is not propagated further than the neighbouring lymphatic glands, or adjacent bone of lower jaw, and death occurs by sloughing or hæmorrhage.

FIBROUS TUMORS OF MUSCLE.—These have considerable interest, because they often have a syphilitic origin, resembling periosteal nodes, and cured by the like remedies. They can scarcely be associated with other fibrous tumors, which are circumscribed, and grow between the tissues; for they appear to be depositions of lymph, becoming fibrous within the muscular tissue, and thus, instead of being circumscribed, they form merely masses of fibrous tissue within the muscle; at least such is the case in those I have seen; and thus, when microscopically examined, they are not wholly fibrous, but consist of fibre and muscle intermixed. They are found often in the tongue, and in other muscles, especially those of leg and forearm. A fibrous mass may arise from any local or accidental cause which should produce an effusion of lymph. I shall have to mention in the next lecture, under Heart, that the fibrous deposits sometimes form in such large masses that they can receive scarcely any other name than tumors.

Cysts are not often met with in muscles. In one I lately saw, the origin was probably a softening of one of the fibroid masses just spoken of.

PARASITES.—The entozoon peculiar to the muscle is the ***trichina spiralis***. A very old specimen,[1] preserved in the museum, I have found to contain them; but the affection was first recognized by Mr. Hilton, about twenty-five years ago; and since that time it has frequently been met with, although not very common. In considering its frequency, I should say, judging from my own experience, that we do not meet with it oftener than once in five hundred bodies we examine, if so often as this. The affection is at once recognized by the voluntary muscles appearing covered with a number of white specks;[2] when more closely examined, the whole thickness of the tissue is seen to be pervaded with these little white oval bodies; they are hard, and always placed with their long axis in the direction of the fibres, and diffused at regular distances, never being crowded into masses. If picked out and placed under the microscope, they resemble miniature eggs; the shells or cases consist of earthy matter, and are very hard, requiring some force to crush them. When broken, there emerges a round worm, pointed at each end, but coiled up as it lay in the sac. It has been stated by some that these parasites are found only in the voluntary muscles, and by others only in the striped muscles; but neither statement is absolutely true, for though they are found in all voluntary muscles, including the small ones of the larynx, diaphragm, &c., yet they are also found in the œsophagus; and, on the other hand, they have never been present in the heart, in all the cases which I have seen.

CYSTICERCUS CELLULOSÆ (*telæ* understood).—This entozoon, as the name signifies, is probably developed in the cellular tissue amongst the muscles, but, as it is often removed from them by the surgeon, it is mentioned as being found in the muscles, and so several specimens from pectoral, gluteal muscles, &c., are placed on our shelves[3] in the present section. I shall have occasion to speak of the cysticercus again, but, as found here, it consists of a rounded sac with a neck, at the end of which are four circular suckers, and a crown of hooklets in the midst of them.

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[1] 1361^{30}.

[2] 1361^{40}, 1362^{16}.

[3] 1362^{30}.

DISEASES OF THE HEART.

PERICARDIUM.

MALFORMATION	Absence.
INFLAMMATION (Pericarditis)	Acute (lymph, blood, air, &c.) Chronic, general, and adhesions. ——— partial, white patches.
ADVENTITIOUS PRODUCTS	Fat, fibrous tissue, bone, tubercle, cancer, &c. &c.

FORM OF HEART.

MALFORMATION	Of cavities, valves, aorta, &c.	
ATROPHY	Deficient supply of blood; cachexia.	
HYPERTROPHY	Concentric.	
	Simple.	
	Eccentric	Active dilatation.
DILATATION	with hypertrophy	
	Simple.	
	with thinning.	Passive dilatation.

Varieties as associated with various Valvular Diseases.

MUSCULAR SUBSTANCE.

CONSISTENCE	As in hypertrophy.	
INFLAMMATION (Myocarditis.)	Acute	General with lymph. ——— pus (pyæmic). Local or acute aneurism.
	Chronic	General or fibrous change. Local. Aneurism of heart.
RUPTURE	Spontaneous from disease. From direct injury.	
ADVENTITIOUS GROWTHS, AND DEGENERATION	Fat, fibroid deposits, osseous or cretaceous, cysts, hydatid.	

ENDOCARDIUM.

INFLAMMATION . . . (Endocarditis)	Acute	Redness and injection. Opacity. Softening, with laceration and perforation. Products of inflammation, vegetation, &c.
	Chronic.	Coalescence. Fibrous bands and thickening. Contraction and calcareous deposits.

VALVES.

INFLAMMATION . . .	Acute	The various stages as above.
	Chronic.	Adhesion, coalescence, narrowing. Perforation, calcareous deposit, &c. Atrophy, aneurism, malformation.

COAGULA. POLYPI. EMBOLI.

PERICARDIUM.

MALFORMATION.—The pericardial sac has occasionally been found altogether absent. Some of our old writers had already observed the fact, but discredit was thrown upon their statements on account of the very frequent obliteration of the pericardial cavity by adhesion, and which was thought a sufficient explanation of the apparent absence. This supposition might have been true in many instances; but, at the same time, such a want of development does sometimes occur; for a few years ago I had an opportunity of seeing a specimen of the kind brought to the Pathological Society by Dr. Baly; where the heart was uncovered, and lay in the cavity of the pleura against the left lung.

INFLAMMATION may be acute or chronic, and attended with various inflammatory products, with the usual results, as in other serous membranes.

In ordinary *acute pericarditis*, a lymph is poured out, which, in the course of a few days, forms a complete covering to the heart, and thus the pericardial sac has to be forcibly torn off to expose the organ within; more frequently there is some serous exudation mixed with the solid lymph, and thus the latter is found in shreds, or presenting a honeycomb appearance; or, sometimes, as if a layer of butter had been placed in the sac and the surfaces suddenly separated. Very recent pericarditis is not seen in rheumatism, since this disease is rarely fatal before a certain period, but is generally met with as a complication of other affections, as morbus Brightii; in which case a thin layer of lymph is found on the serous surface, and this occurs after a day or two's inflammation. If more prolonged, a thick layer of lymph would be found covering the heart; and if there be much fluid effused, together with the more solid fibrinous matter, which is generally not until a much longer period has elapsed, and often seen in fatal rheumatism, then the more solid part puts on a very remarkable appearance, from the fact of the two serous surfaces not being in contact: the lymph floats in the fluid, and presents, consequently, a number of long shaggy processes, or a villous surface like the tongue of a feline animal. This is the condition we generally have in our minds when we speak of acute pericardial effusion as it occurs in rheumatism.[1] Simple serous effusion, or *hydrops pericardii*, is constantly met with in persons who have died of various diseases tending to dropsy, or in wasting disorders. Occasionally the inflammation is of a slower character, and owing to constitutional causes, the exudation is purulent, and thus, in the same way as a pleurisy ends in an empyema, so may a purulent effusion result from a pericarditis: it is not very common, and no doubt is generally fatal. In one case, of which this is a drawing,[2] you see the pericardial sac immensely distended, and within it were thirty-six ounces of pure pus: the man had been ill two weeks.

HÆMORRHAGIC EFFUSION.—It occasionally happens that on opening the pericardial sac, blood is found within, and a question immediately arises as to it source. If pure, it has generally flowed from a burst aneurism or ruptured heart, but very often, on closer inspection, we find the serous surface covered with lymph, and then it is apparent that the blood is merely an accident of pericarditis; in one or two cases lately, I have seen much importance attached to this presence of blood, and the vessel carefully looked for whence it was supposed to emanate; but I say it is merely an accident of the pericarditis, and dependent, probably, upon some constitutional cause; for a disposition to purpura may often be observed elsewhere in the body. The source of the blood is either from new-formed vessels, which, being yet tender, have given way; or, in the absence of proof of the existence of such, it is more likely that the vessels of the serous membrane have furnished the supply; these being highly congested, and the tissues softened. A similar sanguineous effusion is sometimes noticed in the pleura and peritoneum. Occasionally, where the lymph is solid, and the pericardial sac closely in contact with the heart, the blood is found in coagulated layers interspersed with the white laminæ of lymph.

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[1] See numerous specimens of pericarditis on the shelves.

[2] 38^5.

AIR IN THE PERICARDIUM.—Whether air can be secreted from a surface during life, is a question much discussed by pathologists. There can be no doubt that in most cases air found in the body results from decomposition; and with respect to the heart, I have never met with air either in pericardium, or heart itself, that was not clearly due to putrefaction, or had entered from without. In one case, where, owing to very remarkable sounds, it was thought air might be present, the patient recovered.

CHRONIC INFLAMMATION.—As we have already had occasion to mention, the so-called chronic inflammations are often altogether different in kind from the acute, being slow in their origin as well as progress, the process of production of new material being more allied to that of a growth than of an exudation which has subsequently organized. In the pericardium, however, most of such chronic changes have an acute origin; for example, after a pericarditis and effusion of lymph which organizes, a continued succession of exudatory layers takes place; and thus, if the case be fatal within a few weeks or months, the various stages of the process are seen. Thus there may be a firm layer of fibrin adherent to the heart, and over this softer and more recent exudation. Occasionally, however, though much more rare than in the pleura or peritoneum, chronic changes may be met with which seem to have had no acute commencement. Thus the visceral pericardium is much thickened, involving the heart in a thick fibrous layer, uneven on the surface, and encroaching often on the muscular texture of the organ itself. Sometimes the change is exceedingly slow or chronic; so that the term degeneration might with more propriety be used, where fibrous tissue is proceeding from the surface, quite into the muscular structure.

ADHERENT PERICARDIUM.—As a result of pericarditis, the serous surfaces may become wholly or partially adherent, or the membrane merely thickened in particular spots. Thus, several years after an attack of pericarditis which has been cured, an adhesion may be found attaching the front or other part of heart to the sac; not uncommonly the apex is thus adherent, and sometimes a long loose cord is seen attached to it, as of a band which had broken. More frequently than this, the heart is found universally adherent to its serous covering; thus, at the beginning of this year, we found it three times in one week, and quite unconnected with the disease of which the patients died; one, indeed, being an accident, and another a surgical case.[1] I cannot, therefore, but think that its occurrence is quite unconnected with symptoms, or any impaired action of the organ. You might naturally think that, if nature has made the heart to move freely in a serous cavity, the obliteration of this would of necessity impair its motions; but you might also think the same of the lungs; these organs, in like manner, are intended to be free in the chest, and yet adhesions appear to exist with impunity, and are found, more or less, in nearly all cases we examine. There may be, indeed, some amount of impairment of action, but this is not appreciable, nor are any ill effects recognized, and the same is true, I believe, with respect to adherent pericardium; that no ill consequences, which we can discover, result therefrom. When such adhesions were first recognized (at the time of the discovery of auscultation), it was thought that an enlargement of the heart resulted therefrom, and no doubt the two conditions may often be found combined; but in many of these cases it will be seen (as our own shelves show) that valvular disease is also present, and in others that the enlargement might be considered due to other causes, since an hypertrophy often takes place without any pericardial affection. On the other hand, it has been thought that adhesions cause atrophy; and in some cases this appears to be true, particularly where the tough membranous sac has grown at the expense of the muscular tissue beneath; but, apart from such causes as these, my opinion is, that simple pericardial adhesion produces no appreciable untoward consequences.

WHITE PATCHES, OR MILK SPOTS.—The question has long been under discussion, whether the white patches so often seen on the surface of the heart are inflammatory or not: some looking upon them as mere thickening of the membrane, and others as the result of inflammation. If by inflammation we mean that there has been a pericarditis, and lymph effused, which has subsequently organized, there is no proof that such has ever occurred. The difficulty in determining the point has probably had much to do with the obscurity of the term inflammation, for no doubt most pathologists are assured that such patches are of slow formation. If this be granted, it is another question how far chronic inflammation can be applied to such a process. Occasionally, as a result of pericarditis, some of the lymph may remain and organize, producing white thick patches on various parts of the heart; but these are mostly irregular, and at base or apex, while the white patches of which I speak are always on the most prominent parts of the organ. Thus on the front aspect, in the middle of the right ventricle, a circumscribed white smooth patch may often be seen; the same also on posterior aspect, especially on the projecting coronary vessels, and sometimes on the right auricle. My own opinion coincides with the *attrition* theory—that they arise merely from the most prominent parts of the heart rubbing against the pericardium, and formed therefore in the same manner as callosities in other parts, or as corns on the toes; which are not, if of slow formation, generally called inflammatory.

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[1] See numerous specimens of adherent pericardium.

ADVENTITIOUS PRODUCTS.

As a result of inflammation the pericardium may be changed into a tough fibrous tissue; this may undergo an earthy degeneration, and thus large *bony plates* be formed within it, as you see in these specimens.[1] Sometimes a large patch, as large as the palm of the hand, may be met with in front of the heart; sometimes a circular portion, forming a kind of collar around the base of the organ; and in other cases a mass at the apex of the heart, fixing it to the diaphragm; the neighbourhood of the diaphragm being very favourable to the formation of these bony masses, as seen at base of lung on its upper surface, or over spleen on its under. The term bone is used because in outward appearance they resemble bone, but no true osseous structure is present.

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[1] 1448, &c.

Fat often exists in excess on the heart, but its importance is connected generally with degeneration of the tissue with which it is associated, and therefore I shall refer to the subject hereafter.

CANCER.—In cases of universal cancerous deposits throughout the body the pericardium may also be included, and numerous white elevated patches of the deposit may be found upon it. Also, in cases of cancer of the lung, pleura, or mediastinal glands, malignant growths may penetrate the serous sac. Such deposits are, however, rarely found on the serous surface of the heart.

I will show you at this time these remarkable specimens of hearts of oxen, said to have been the subject of fungoid disease; you see the whole surface of the heart is covered with long shaggy processes, or villi, giving the organ a hairy appearance. I have not yet had an opportunity of examining them; but I believe the appearance is merely due to an inflammatory lymph sprouting into a large space containing fluid, and hence this villous appearance.

TUBERCLE.—In the same way as cancer may occur on the serous sac, so may tubercle in cases of general tuberculosis. They are seldom, however, found without an inflammatory process being present at the same time, and thus the affection is analogous to a tuberculous meningitis or peritonitis; the inflammation is essentially chronic, and therefore may be looked upon as one of the forms of chronic pericarditis. A good specimen is here seen;[1] the pericardium is closely adherent, and on separating and tearing open the lymph, a quantity of tuberculous matter is seen amongst it.

HEART.

MALFORMATION OF HEART.—Much light has been thrown upon the subject of malformation generally, by considering what changes would be wrought upon organs by diseased conditions occurring at an early period of fœtal life, when the parts are yet plastic, ready to yield to any new influence; and how, also, other structures in connection with them would of necessity be modified to stand in relation with the altered parts. Such considerations have afforded many explanations regarding malformation of the heart. In speaking of diseases of the fœtus, remember I do not use the term in a general sense, as implying a mere deviation from the normal or healthy standard, but something much more definite; that after a fœtus shall have progressed in development up to a certain period, it shall then be subject to a disease similar to what occurs in the adult, and that in consequence various adhesions or obstructions may result, which, from the parts being still plastic, and undergoing great changes during growth, produce those alterations in form which we call malformations. It is true that there are arrests of development, and want of union of the two symmetrical halves of the body, and the same occurs in the heart; but still a large number of malformations appear to be due to the cause I name: that diseases do occur in the fœtus, you can easily prove by examining still-born children, and especially those of syphilitic mothers, when you will find, as I have often done, acute inflammation in the abdomen, peritoneal adhesions, pneumonia, &c.: an acute endocarditis is thus supposed to occur in the same way as in the adult. Even if the proof of this should be wanting, which I think it is not, the theory forms a good hypothesis on which to found the various appearances met with in malformed hearts, and on which I can give a general explanation of the different kinds of malformation seen on the shelves of our museum; for otherwise it would be impossible to describe each separately, seeing that we have more than thirty specimens, and scarcely two alike. I will, therefore, merely show you the most common, and the mode on which they appear to be formed; and, first of all, what they are not. A general impression for a long time prevailed, that an open foramen ovale or ductus arteriosus is a common kind of malformation; this belief was founded both upon the fact of such conditions being met with, and upon the opinion that a malformed adult heart would very probably be due to the permanence of a fœtal state. Such opinion I still find prevailing among students, but now warn you against it, as being rarely true. The most common form of malformation, and that of which I have seen the greatest number of instances, consists of an imperfect ventricular septum, and one vessel coming off from the two cavities, the lungs being supplied by some irregular means; and with these irregularities an open foramen ovale or open Botalli's duct coexists. Now, these and similar changes may be accounted for by supposing that in early fœtal life, say about the sixth or eighth week, an endocarditis occurs (and we know, from observation, that this is more liable to happen on the right side than the left), and the pulmonary valves become affected by an inflammatory change; adhesions occur among the valves, causing the partial closure of the artery, or the vessel becomes closed or obliterated, and then we can well perceive what the subsequent necessary result would be. At this time, remember, there is no perfect septum between the ventricles, and the blood of the right freely communicates with that in the left cavity, and therefore, if any impediment should occur at the outlet of either, the closure is prevented at the proper period of its occurrence; and thus the deficiency occurs in the wall which you see in these specimens, where the pulmonary artery is contracted. Again, in consequence of both ventricles supplying one vessel, the aorta, the latter becomes placed over both of them, which are then of equal size, and the heart rounded in shape. If the obstruction be thus compensated for by an outlet into another channel, there may be no great stress on the auricle behind, and the foramen ovale may close as usual; but very often it remains patent, in order to relieve this chamber of the heart. And now as regards the supply to the lungs; in consequence of closure of the pulmonary artery, the ductus arteriosus remains open, and thus the lungs are supplied from the aorta. The blood is necessarily mixed, and thus one cause of cyanosis and early death in such cases, although very often the duct is brought low down over the right ventricle, so that it gathers most of its blood from this side. You see, then, how an obstructed pulmonary artery necessitates all these further changes; a passage of blood into the left ventricle, and then a way out again into pulmonary arteries, by the fœtal ductus arteriosus remaining patent. All these different alterations in the heart would so clearly arise from an obstructed pulmonary artery, that I think there can be little doubt that here lies the *fons et origo mali.* In the three or four cases of malformation of the heart in persons who have grown to adult age, the peculiarities have been of the kind I mention.

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[1] 1445^{50}.

In some cases the obstruction of the pulmonary artery is not complete, and the various conditions mentioned may be less marked, as in cases where the valves unite to form a funnel-shaped membrane. In some instances the pulmonary artery is united to the aorta, and both come off from a common ventricle; in other cases, the vessels are transposed.[1] In some remarkable cases, although the pulmonary artery is closed or wasted away, the ductus arteriosus is also closed, as was the case from which this specimen[2] was taken; but the lungs were supplied by immensely dilated bronchial arteries. In some other cases the aorta is obstructed, and the pulmonary artery carries the blood from both sides of the heart, the descending aorta being attached to the pulmonary. It is seen in this heart lately found in the dissecting-room. I cannot mention all the other varieties met with, but you see in these preparations that the septum ventriculosum is sometimes imperfect at its upper part, without any other alteration; when this is the case, the question often is asked whether it has arisen from disease; *i.e.*, from endocarditis and softening of muscular structure, or malformation; but on the supposition that malformations arise from disease, it is possible to conceive that such occurred in the fœtal state, this condition being the remnant of it, and both opinions correct. I stated just now that the old notion was erroneous, that malformed hearts were due to want of closure of the openings natural to the fœtal state; and you will now see that such open channels necessarily follow from previous obstruction, and constitute conservative results rather than morbid states; still, however, such are occasionally met with without any of those obvious causes to which I have alluded, though it is possible that even these may have existed for a time, and afterwards disappearing, the effect had remained. I should mention to you, however, that a simple patency of foramen ovale is not uncommon, being met with in about one in every thirty cases; but the opening is valvular and incapable of allowing the passage of blood. I may here show you this heart, where the membrane closing the opening bulges out; and in this, where it is cribriform.

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[1] 1392^{45}.

[2] 1383^{25}.

Here are some malformations of the heart which depend on deficient development, found only in the fœtus or children who survive but a short time their birth. Thus sometimes a heart is met with having only one auricle and ventricle; and in this case it protruded from the chest, constituting *ectropia cordis*.[1] Occasionally, too, we meet with instances where the right ventricle is divided by a septum.

MALFORMATION OF AORTA.—One of the most remarkable is a congenital contraction, or total constriction of the vessel just below the arch, and contiguous to the ductus arteriosus, where the recurrent laryngeal nerve curves around the vessel. There are not many cases on record, but it is remarkable that they are all exactly of the same character, and the contraction at the same spot; whence it would appear as if a similar cause for its production existed in all, and that some of those changes which cause obliteration of the duct were inordinate, and involved the whole vessel. As a consequence of the obstruction being at the same spot, the results are the same, and the anastomosing vessels similar in all cases. We have two or three specimens in the museum, but I am able to show you this fresh one[1] which occurred only the other day. You see the aorta is closed just as it makes its curve downwards, so that it will only admit a crow quill; below this the vessel is small, and the walls thin; but the arteries, as superior intercostal, which enter it, are large, showing that the blood has passed from them into the larger trunk. The iliac vessels also are small, but suddenly become large after receiving the epigastric; these arteries being very capacious, and supplying the lower limbs with blood from the internal mammary, which you see are of immense size. Other branches also from the subclavian along the back were very large. You see the heart is much hypertrophied, indicating the obstruction in the circulation; this, I believe, is not generally the case, the constriction or stenosis of the aorta being harmless and found accidentally; but in the case of this young man it caused his death, although he had good health until he joined the militia and underwent considerable exertion.

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[1] 1379^{25}.

Atrophy of Heart.—This may arise from various causes. General atrophy is found in a large number of cases where the patients are long ill; but is especially seen in persons who have died of cancer, when the heart is found of very small size. If any part of the heart receive a deficient supply of blood it wastes; and thus, sometimes when the mitral orifice is small, the left ventricle is small; sometimes the organ wastes if there is much external fat; and, occasionally, in adherent pericardium, particularly if the latter grows to any thickness at expense of the muscle beneath it. When a cavity is dilated the walls are sometimes much thinned.

Hypertrophy and Dilatation.—The various forms and varieties of these are seen in the table; thus *hypertrophy* is spoken of as *simple* when there is a mere addition of muscle to the exterior of the walls; as *concentric* when it is at the expense of the interior; and *eccentric* where the cavity is enlarged; and as regards *dilatation* there is that which is called *simple, dilatation with hypertrophy* of the walls, and *dilatation with thinning* of the walls. It will be seen why the terms active and passive dilatation have been applied to these varieties; passive dilatation[1] meaning the giving way of the ventricle, and, therefore, applied to thinning when combined with dilatation; whereas active dilatation, means dilatation with hypertrophy, and this also includes simple dilatation, for there must have been a constant production of muscular fibre proportionate to the increase of size, although the thickness in this case is not absolutely more. The terms active and passive aneurism have also been applied, but these had better be avoided, so as to keep them in reserve for circumscribed or sacculated cysts on the heart. These different forms of enlargement can easily be reduced to four, for it will be seen that two are alike—the eccentric hypertrophy and hypertrophy with dilatation; and, as it is very doubtful whether there is such a condition as concentric hypertrophy, two may be struck off the list. The cases of supposed *concentric hypertrophy* have generally occurred in persons who have died of hæmorrhage, where the heart is found empty, and the left ventricle firmly contracted on itself; the cavity being thus obliterated, an appearance of hypertrophy is given to it; but if such heart be kept for some time it will relax, and a cavity be formed in it as usual. Thus the so-called concentric hypertrophy, probably, merely shows a mode of death; for in all supposed cases of it, no symptoms of disease exist during life, and the condition is only noticed accidentally after the occurrence of death in the manner mentioned.

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[1] 1450^{90}.

Of the *four* conditions commonly met with, I will speak first of *simple hypertrophy*. This is found on both sides of the heart. On the right side, the ventricle is thickened in cases of pulmonary obstruction, whether this be due to primary obstruction in the lungs, as in bronchitis or emphysema, or be secondary to cardiac disease, as narrowing of the mitral orifice. In this specimen[1] of a heart from a case of bronchitis, you see the walls of the right ventricle are very much thickened, including the muscular bands, especially the moderator which crosses it; and besides this, the texture is very remarkable, being exceedingly tough. Simple hypertrophy of the left ventricle is best seen in chronic Bright's disease, where it is very frequently met with; but whether it is due to an obstructed circulation owing to diseased bloodvessels, which are generally found in this affection, or to other causes, is not positively ascertained; the walls of the left ventricle are very thick, and apart altogether from any disease of the organ, as you see in this specimen.[1]

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[1] 1391^{80}.

Dilatation with hypertrophy is perhaps the commonest change met with, and of which you see many examples here.[2] On the right side of the heart the ventricle may be enlarged, as well as its walls thickened, but it is especially in the left ventricle that this condition is seen, either in cases of aortic disease, or cases of general increase of the heart; and thus it is usually associated with enlargement of the whole organ.

Simple dilatation is where a cavity is enlarged, but the walls retain their normal thickness, as you see in these cases where the mitral valve admits regurgitation.

Dilatation with thinning of the walls generally is accompanied by a degeneration of the muscular tissue, or indicates some constitutional weakness on the part of the patient, so that the chamber of the heart gives way when over-distended. When the left ventricle is much stretched, I said the term aneurism had been used; but, though I have avoided it, yet in some instances we can scarcely adopt any other name, as in this instance,[3] where you see the left ventricle immensely distended, and the walls thinned into a membrane scarcely thicker than a bladder.

In simple hypertrophy the muscular walls may be uniformly thickened, and the trabeculæ or columns within participate; this is remarkably seen on the right side, where these muscular bands are often of great thickness; where the hypertrophy is very great, the lower portion is often much thicker than that above. In the left ventricle the thickness is generally uniform in simple hypertrophy; but if combined with dilatation, the walls are thicker at base, and become gradually thinner towards the apex; and in these cases the mitral fleshy columns are not proportionally enlarged, but have a tendency to become narrower or pointed towards their upper extremity, particularly if the auriculo-ventricular orifice be enlarged. In the auricles the thinning or hypertrophy is uniform throughout.

These altered conditions of the cavities of the heart, which some students think are so numerous and difficult to remember, are then simply four: a simple thickening of the walls, a simple dilatation, a dilatation with thickening, and a dilatation with thinning. These conditions are found in different parts of the heart, but are especially applicable to the left ventricle. The right ventricle being simply hypetrophied or hypertrophied with dilatation, while the right auricle is generally simply dilated, while the left is considerably hypertrophied with its dilatation.

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[1] 1389^{25}.

[2] See numerous specimens.

[3] 1396^{75}.

The three most usual changes in the form of the heart are in the following diseases. Hypertrophy of *right side* in bronchitis and emphysema, in consequence of which the ventricle is enlarged and reaches below the left; the apex of the heart is thus formed by the right, and the whole organ is broad; or, in fact, has more or less of a rounded form, instead of being conical. It is important to recognize this, for it tells a tale of long-standing pulmonary obstruction.

In cases of contraction of the *mitral orifice*, the left auricle becomes overcharged, consequently distended, and its walls hypertrophied; and thus, from being a small thin walled cavity, it becomes often of very great size, and its walls remarkably thick and tough, and uniformly so throughout; as a pulmonary obstruction necessarily results, the right side is in the same condition as has just been mentioned in connection with bronchitis. Thus the heart in contracted mitral orifice, is rounded from enlargement of right side, and with this there is an enlarged left auricle. In simple obstruction through the auriculo-ventricular orifice, the left ventricle is little altered, but it is commonly found slightly distended; this probably being connected only with the fatal illness, owing to the final giving way of the valvular structures, or the weakened condition of the muscle itself.

It is in *aortic disease* that we have the immensely enlarged or *bovine* hearts, as they are sometimes called; the proportion of the parts being kept, though all are enlarged. Owing to the obstruction at the mouth of the aortic orifice, and the subsequent reflux of the blood, the left ventricle becomes often immensely distended, and the walls thickened; and if there be much regurgitation, and the muscle poor in texture, it is often much thinner at apex than base. As a consequence of this impediment to the flow of blood in left ventricle, all the other parts participate, as just now mentioned, and consequently the whole heart is enlarged.

Apart from these more obvious causes of enlargement, we meet with cases of *simple enlargement*, without any valvular disease, and these constitute, generally, the largest hearts found in museums: an example is here seen.[1] In some of these the orifices are increased, but this may be due to a consequence of the ventricular distension,

[1] 1396^{60}.

or from a necessary association with it. Thus the left auriculo-ventricular orifice is enlarged, and, probably, allows the blood to regurgitate, for the ventricle is often greatly distended at its posterior part behind the valve. The frequent association of this simple form of enlargement with Bright's disease and rigid arteries, suggests whether it be only a further stage of the ventricular hypertrophy already mentioned—that, owing to some peculiar circumstances, the left ventricle not only hypertrophies but dilates, and with this the mitral orifice and then the lungs being gorged, the right side is enlarged, and the subsequent effects. Dr. Gairdner thinks such enlargement may be due to a contraction of the lung, which, if from any old pleurisy, cannot fill the chest, the heart expands to compensate for the deficiency.

MUSCULAR SUBSTANCE.

Consistence, etc.—It may be as well to mention here, in connection with hypertrophy, the changes which must necessarily take place in the muscle. The question has long been asked, do the muscular fibrillæ grow larger in hypertrophy, or are new ones formed? There are some who think that the fibres actually grow in size, but of this there is some doubt, although there can be none as to their increase in number. I have often examined hypertrophied hearts, and I confess there is great difficulty in making out the point; but I have constantly seen fibres sending out offshoots or splitting into two, and also I have seen nucleated fibres which, probably, were the germs of new tissues. I have already shown you how remarkably the hypertrophy of the right ventricle differs from the left: in the latter it is due merely to increase, while in the former, there is a difference in texture; and thus, if the wall of the right ventricle were not increased in actual thickness, its hypertrophy would be shown by its toughness; if you feel the two ventricles of this hypertrophied heart, you will perceive that one can be readily torn through by the finger, while you cannot do this to the right without considerable difficulty. Why this tough leathery consistence should occur on the right side and not on the left, is not altogether clear; whether the original texture on the two sides is in any way different, or whether there is any restraint, owing to the mechanism of the part, under which the right ventricle hypertrophies, which may account for it, has still to be determined. It is important that you should recognize this change by feeling it, for thus you will be able to ascertain the fact of an overworked ventricle.

MYOCARDITIS (*or inflammation of the muscular substance*).—It is highly probable that in those very common cases of inflammation of the exterior and interior of the heart accompanying rheumatic fever, the muscular structure itself is often involved.[1] I think so for many reasons: first, in a heart affected with pericarditis and endocarditis we have proof, though many years afterwards, that the muscle was affected, in the fact of this structure being occupied by an adventitious fibrous tissue; secondly, the enlargements which occur after such inflammations, with only slight valvular disease, cannot be accounted for except by some altered condition of the muscle; also, in fatal pericarditis, if the adjoining muscular tissue be examined, the fibrillæ will be found granular, as if some change had occurred; and it is only on the supposition of some alteration in the part that we can account for those sudden deaths which sometimes occur in rheumatism.[2] It is not remarkable that in

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[1] 1401^{20}.

[2] As such cases are not generally alluded to, I will briefly mention those that have come under my own notice or are related by others; and it is a remarkable fact that they all occurred in young women :—

Case 1.—Some years ago a girl was under Dr. Bright's care in Guy's Hospital for rheumatism, and died suddenly. Owing to a large fæcal evacuation having occurred shortly before death, he suggested a metastasis to the intestine, as no disease could be discovered in the body.

Case 2.—On July 17th, 1848, a girl, at 20, was admitted into Guy's Hospital under Dr. Barlow, with acute rheumatism ; she was going on favorably, and at three o'clock on the morning of the 15th, the night nurse gave her some drink, but at five o'clock she was found dead. A careful post-mortem examination was made, but there was no apparent disease in heart, brain, or any other organ.

Case 3.—In the *Lancet*, of October 4th, 1851, there is related the case of Elizabeth F., at 26, who was under Dr. Cobb, in the London Hospital. She had been ill a few days with acute rheumatism, and was being treated in the usual way, when on the sixth day after admission, she suddenly screamed out, groaned, and her countenance was expressive of the deepest anxiety. Her breathing was hurried, the heart beat in the most impetuous manner, and so violently and loudly, that the sounds could be heard at the foot of the bed. She then fell into an insensible state, with convulsive movements, and died four hours after the attack. After death the heart was found apparently quite healthy, as well as all the other organs.

Case 4.—A young woman, of 23, under Dr. Addison, in December, 1857. She had been ill some days with acute rheumatism, when she became delirious, like the above cases, and died in two days. It was thought after death that the pericardium was too cases of speedy death no very marked changes beyond softening should be observed in the muscle; but I think, nevertheless, that there is such an affection as an *acute general inflammation* of the muscle, as the results are seen in the changes just mentioned.

A *pyæmic inflammation* is of a different kind, for here the whole tissue is not affected, but only those parts where the pus is found. It is seldom met with except in cases of violent and general pyæmia, and where the whole body is similarly affected. Thus I have seen several cases, and they have mostly been in youths, where all the organs of the body have contained purulent deposits, and the heart has not escaped—the immediate cause of death in these instances being a pericarditis from the bursting of small abscesses in the tissue; thus you see in this specimen, besides the lymph covering the serous membrane, a number of small points of purulent matter within the substance of the heart itself. The character of these is peculiar, and resembles similar deposits in other parts, in their being surrounded by a halo of congestion, and which seems to indicate, as I shall hereafter mention, that this form of inflammation arises primarily from stagnation in the bloodvessels, due to the contamination of the blood with some of the elements of pus; for in other parts of the muscle[2] you could see, when it was quite fresh, small red patches of congestion, constituting the stage prior to the inflammation.

Acute local inflammation is sometimes met with in connection with endocarditis, especially when attacking a valve; and, owing to the changes which necessarily follow in the substance of the heart, the name of *acute* or *false aneurism* has been given to it. The case is generally of this kind: during an attack of acute rheumatism, in which the endocardium is affected, especially the aortic valves, the inflammation causes an ulceration or destruction of the serous membrane, and the muscular tissue external to it becomes involved in the same process; the latter then softens into a pus-like

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vascular, and that the serum was opaque, denoting an early condition of inflammation; but apart from this nothing was found. The brain was quite healthy.

In the absence of very accurate knowledge with respect to rheumatic carditis, I have simply related the cases to show that in all probability the heart is seriously involved, and that attention may be directed in any future instances to discover any changes which may have occurred. It is possible, however, that affection of the muscle may happen similar to rheumatism in other muscles, and the heart, being thus suddenly affected, is paralysed. The delirium attending heart affection has already been noticed by Dr. Watson, with the absence of all disease in the brain.

[2] 1396^{45}, and drawing 38^{10}.

fluid, which, escaping into the blood, may produce great constitutional disturbance; and, at the same time, an opening or hollow is formed on the inner side of the ventricular wall; if the process still proceed outward, the visceral pericardium is softened, and an acute pericarditis is set up, as seen in this preparation,[1] from a case which occurred only a short time ago in the hospital. The patient was a young girl who had acute endocarditis; and you see the muscle was involved close to the outer aortic valve, and thus this sac or false aneurism was formed. The bursting of such a sac might possibly cause sudden death by hæmorrhage into the pericardium. The softening or abscess need not necessarily take its course outwards in this direction; for sometimes it proceeds between the valves, and forms a small aneurism, which is permanent; sometimes such an aneurism may eventually burst upwards, between the ventricle and auricle; or, if the process be towards the septum, a pouch may be there formed, or an actual perforation.

ANEURISM OF THE HEART.—In connection with the above-named affection, I may now speak to you of true aneurism of the heart, or that form of disease where there is a sacculated pouch given off from one of the cavities of the heart. The most marked cases are those where there is a circumscribed pouch, and a small opening communicating with the larger chamber within; in those instances there has generally been no history of inflammation of the heart, and therefore there is no proof that they result from the process just named; moreover, they are found often towards the apex of the organ, while the acute aneurisms just spoken of are mostly in connection with the valves. They seem rather due to some chronic process, and formed like aneurisms in the bloodvessels. I need not mention again that I do not allude to a general dilatation of any of the cavities of the heart, which is called by some aneurism; for it is only in exceptional cases, as in this remarkable specimen,[2] that the term can be so used. They are mostly found, I say, at the apex of left ventricle, though sometimes in the auricle, especially the left. Sometimes they are mere pouches in the muscular walls; the ventricle being itself enlarged and atrophied, and then a thin walled sac coming off from it. You will see the condition in this specimen,[3] and also in this, where the aneurismal dilatation burst.[4] One of our best specimens is this which I now hold in my hand,[5] and which came from a patient of mine, who died of phthisis. It was

[1] 1417^{15}, and drawing 40^{26}. [2] 1396^{45}. [3] 1396^{50}. [4] 1396^{25}. [5] 1395^{30}.

found accidentally, and had undergone changes which had resulted in a cure; it is situated, as you see, at the apex of the heart, and was firmly united to the pericardial sac. It is about the size of a pigeon's egg, of an oval shape, its walls bony and very hard, and communicating with the ventricle by a small opening which would only admit a quill. Its interior was occupied by a soft translucent matter, which appeared to be fibrous, and had undergone considerable degeneration. Wherever, then, we find a pouch projecting from any part of the walls of the heart, we may call it an aneurismal dilatation; if a distinct sac, an aneurism; in which case, if it be well marked, the muscular fibre has disappeared, and sometimes scarcely anything but a membrane remains.

INJURY AND RUPTURE OF THE HEART.

Although two distinct conditions are here referred to, I place them together in order that they may be contrasted, as it is of great practical importance that they should be. The one is rupture of the heart from direct violence, and the other that which arises spontaneously; and the fact of knowing that two causes may exist for the accident, was only lately seen to be of the greatest consequence in a trial for manslaughter. Spontaneous rupture of the heart, in nearly every case, arises from a softening of the tissue, and may be considered, therefore, as indicating generally a diseased organ; whereas a healthy heart may be injured by violence. Moreover, the spontaneous rupture occurs, for the most part, in the left ventricle; whereas the part of the heart most liable to injury is the right ventricle, or front part of the heart, as you might expect. Rupture from disease occurs mostly in persons advanced in age, in whom a fatty degeneration has taken place; and the laceration occurs generally in the left ventricle, towards its apex, by a slit more or less transverse running in the course of the fibres,[1] and sometimes an inch or two long; in some exceptional cases the rent has reached the septum. Sometimes the laceration is merely on the exterior of the heart, and has not penetrated the interior, as seen in this specimen, where two or three superficial rents[2] are seen, and death occurred from hæmorrhage into the pericardium. Other parts, as right venticle or auricle, are less frequently affected. I

[1] 1400^{56}.

[2] 1400^{28}.

was told lately of a case where the left auricle burst into the pericardium, and caused death; and two or three others I have read of. I shall speak of rupture of internal parts presently. I said just now, that spontaneous rupture might nearly always be considered as indicative of disease of the muscular structure; and I should have said so without any qualification, had it not been for this doubtful specimen[1] contained in this bottle. It is a heart which has been long in the museum, having a rent 2½ inches long through the posterior wall of the left ventricle, near the apex; but only the end of the slit can be seen in front. I have taken this heart out to examine, but cannot find any degeneration of the tissue. It came from a brewer's drayman, and the history is, that while lifting a barrel of beer, he suddenly fell dead; there is no mention of his having received any injury, and the character of the rupture appears to contradict any such supposition. Rupture from direct violence occurs mostly in the front part of the heart, and is generally associated with injury to ribs or sternum.

PUNCTURED AND GUNSHOT WOUNDS.—These are by no means invariably at once fatal, patients living sometimes for weeks after such injuries, and slight wounds may probably be recovered from. The injury, if not fatal at once, produces death by the subsequent inflammatory results. In this specimen, which was lately given us by Mr. Callaway, the heart is traversed by two bullets; but the man spoke after the receipt of the wounds. Many of you saw a patient who was last year in the hospital, who was stabbed through the pericardium, although the heart appeared untouched: the man lived two days.

Effusion of blood is sometimes met with in the substance of the heart, in cases of purpura, or those diseases where the blood is affected. Also beneath the endocardium, on the interior, such purpuric patches may be seen; and this has long been noticed as occurring in cases of poisoning by arsenic. In the last case examined in this hospital, patches of ecchymosis were found in the right auricle and left ventricle.

ADVENTITIOUS GROWTHS AND CHANGES IN MUSCULAR FIBRE.

Fatty degeneration is of two kinds, that where there is an actual increase of fat, and that where the muscle is independently degenerated. The first form is met with mostly in old people who have grown fat, in whom there is an excess of superficial adipose tissue, both externally as well as amongst the viscera within; also in those where there is not an excess of free fat, though a disposition to fatty degeneration, which is generally the case as age advances: the same disposition is seen in those who have been intemperate, especially those accustomed to an excessive use of malt liquor. In such we find the front of the heart wholly covered with fat, so that only a small portion of the muscle of the right ventricle can be seen; and, on cutting into the cavity, we find the adipose tissue has penetrated the muscle and streaked it throughout, or, by its encroachments, actually destroyed it, so that only a few muscular fibres can be found in the front part at apex and base; the wall being quite destroyed in the middle. On the left side the muscle may be similarly encroached upon; but, independently of this, it may be found soft, yellow, and pasty. Such a ventricle may suddenly cease to act, and thus cause sudden death;[1] it is probable, too, that in such a heart a cessation of the *right* ventricle might also cause death. This is the form of fatty heart which our older writers found associated with disease of the coronary arteries as a cause of *angina pectoris*, a good example of which you may see in this specimen.[2] It has been observed by Dr. Quain, that a branch of the vessel, the most diseased, is found proceeding to the part which has undergone the most complete degeneration.

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[1] 1400^{84}.

Fatty degeneration may exist without any increase of external fat, and may occur in a person otherwise thin; and is also found often accompanying valvular disease of the heart. It may be of two kinds,—one where the whole muscle is affected, as is generally the case in the fatty hearts before alluded to; and the other where the inner surface of the heart is affected in a peculiar manner. In the first, the muscle is yellow, flabby, and easily lacerable; while in the other, the muscle is often of a good color, and the external part healthy, but within, it is seen to have a peculiar streaked appearance; on looking carefully at it, a number of white transverse zigzag lines are seen running parallel to one another, producing a feathery appearance, and which is very well portrayed in these drawings.[3] They are seen especially, and in the first instance, on the mitral columns of the left ventricle; afterwards, they appear on other parts of the cavity, and in extreme cases may be seen in the right ventricle. I have never seen it in the auricle. The peculiar condition only penetrates a slight depth into the substance of the heart. A question arises how long is such a process in formation, and what are its exact pathological indications. Some German pathologists have, I believe, suggested whether, indeed, the whole appearance may not be post-mortem; but this I do not think, since it is found in connection with other disease of the heart, and especially in those cases of simple anemia which have been called idiopathic, for want of other explanation. I cannot show you this condition, for it altogether disappears after the organ has been kept; but I shall, no doubt, be shortly able to do so on a recent heart. It is still a question as to the source of the fat, whether it is a normal constituent or an actual increase; and Dr. Weber, by means of chemical experiment, has shown that the fat is often no more than normal, but that integral changes have taken place by which the various constituents have been separated, and the fat has discovered itself in a visible form.

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[1] 1400^{60}. [2] 1500^{35}. [3] 39^{68}.

FIBROID DEPOSITS AND DEGENERATIONS.—I said just now, in speaking of myocarditis, that the results of inflammation were seen in streaks of fibrous structure running into the muscular substance. Extreme examples of this kind are always combined with indications of previous endocarditis and pericarditis, and are allied to the changes seen in the liver, lungs, &c., where the investing capsule is the subject of chronic inflammation, which involves the adjacent texture, and thus, the pericardium being thickened and adherent, the neighbouring muscular walls become involved in the fibrous change. This is shown by a section of the wall of the ventricle, as in these specimens,[1] where fibrous bands and streaks will be seen pervading the tissue in all directions. The interior of the ventricle is of a pearly whiteness, owing to a thickening of the endocardium, and the muscular trabeculæ beneath, when cut asunder, are seen to have a mere trace of muscular fibre in their midst, and some of the smaller are wholly fibrous. In some rare instances like this,[2] the fibrous structure may be deposited in a circumscribed mass, as seen in the septum ventriculorum of this specimen, and which might be almost called a tumor of the heart; I have suggested whether this might have a syphilitic origin.

Besides these changes, which may occur at any age as a result of disease, a similar alteration may occur as a senile condition, and be

[1] 1396^{55}.

[2] 1396^{70}.

called fibroid degeneration, and may, I think, so alter the structure of the heart as to be a cause of sudden death. The change I speak of affects especially the mitral muscular columns, whose upper part is replaced by fibrous tissue; the tendinous cords which are attached above, seem to pass down and encroach on the carneæ columnæ, so that only a portion of the muscle is left below to join to the ventricle. In this specimen,[1]—which, however, might have been due to an inflammatory change—you see the muscular column streaked within with fibrous structure.

TUBERCLE.—This has already been spoken of, as affecting the pericardium, but does not, as far as I know, penetrate the muscle.

CANCER.—I have already said, under pericardium, that cancer may penetrate to the heart from without; thus, in cancer of the lung or bronchial glands, the disease may proceed along the course of the pulmonary vessels into the cavities of the heart, as seen in this specimen,[2] taken from a patient of my own. A large cancerous tumor of bronchial and mediastinal glands, compressed the vena cava and other vessels, and protruded, as you see, into the right auricle, and also, as a large tumor, into the left. In this other specimen,[3] the cancer seems to have penetrated the muscular substance. As independent deposit, in cases of general cancerous disease, it is extremely rare; the only specimen I have ever met with is this, where a few cancerous nodules are seen beneath the visceral pericardium.

Melanosis of the heart is seen in this specimen.[4]

Hydatid of the heart. This occasionally occurs in the heart, though it is rare in the human subject. The cysts grow, probably, in the muscular substance, and then cause death by rupture. In this heart,[5] from a girl who died in the hospital about two years ago, the hydatid cyst is seen growing in front of heart, between the auricle and ventricle, forming a cavity between the two. It is about the size of an orange, and at the bottom of the jar you see the smaller cysts which came from it. The bursting of the cyst caused fatal pericarditis. In another case, the rupture occurred into the right ventricle of the heart. I may mention that there are cases recorded of hydatid of the liver bursting into the pericardium.

The *trichina spiralis*, which infests most of the muscles of the body, and all the striped ones, is never found in the heart.

[1] 1393^{45}. [2] 1399^{55}. [3] 1398^{50}. [4] 1400^{25}. [5] 1396^{55}.

Among adventitious growths, I may show you this heart,[1] having two cysts on its front aspect. They are formed of thin membrane, containing a fluid, and are traversed throughout by a number of delicate fibres. Of what nature these cysts are, I cannot say. The heart came from a lunatic, who, while attempting to strike another man, fell down dead, and the cause was found to be due to a rupture of these cysts into the pericardium.

I must also show you this very remarkable specimen[2] of growth upon the heart, an osteochondromatous tumor, like a large mass of coral, growing upon the organ, and as large as itself. Whether this is a secondary growth to similar tumors in other parts of the body to which it belonged, or whether it be the remains of an included ovum which had become attached to the heart, I cannot say.

ENDOCARDIUM.

INFLAMMATION.—The endocardium corresponds to the inner coat of the bloodvessels, and, therefore, the remarks I am about to make are, to a great extent, applicable both to heart, with its valves, and the arteries. The main subject for consideration, and that which is still a vexed question with pathologists, is, how far such a membrane can be said to be inflamed, and the fibrin found upon it be the result of inflammation. The arguments are mostly against its being the subject of inflammation in the ordinary sense of the term; for, in the first place, it is said that the inner membrane of the vascular system is devoid of bloodvessels, and, therefore, cannot inflame, an inflammation meaning a certain condition of the capillaries; then, again, there are the *à priori* arguments against it, that the vessels which are the subject of inflammation in any part, are those which nourish that part, and whereas there is reason to believe that the inner surface of the bloodvessels is nourished by the blood flowing within them, it is to this fluid we should look for the changes which occur in apparent inflammation; physiologists thinking it is more probable that the lining membrane is nourished from within than without, for, if the latter, in the same way as other parts, there would be a constant discharge of its epithelium into the blood, and which they think very improbable. I do not value much, however, such arguments as these, but would trust more to direct observation, as to the experiments of Lee and others, who have failed to excite this membrane to inflammation. A portion of a bloodvessel has been taken, and irritants placed within it, but without producing any visible effect, or any appearance of exudation. Taking up the same view of the subject, it is said that the fibrinous masses adherent to the inner side of heart and arteries can, in many instances, be satisfactorily proved to be mere deposits from the blood; these being generally found in those parts of the vascular system where a mechanical cause has been present, acting as an impediment to arrest the flow of blood, and thus cause its coagulation. Thus any cause of obstruction to the flow (as was many years ago observed), by passing threads into the vessels, will cause a deposit of fibrin upon them; and, in the same way, coagula and fibrinous masses may be seen hanging to rough patches on the aorta and smaller arteries, and the same in aneurisms; moreover, such deposits are, in most instances, not to be distinguished from the vegetations and other concretions supposed to arise from an inflammatory source, and, even in those cases where there may be reason to suppose some of the concretion is an exudation, it is so covered by recent coagulum that it is difficult to say where one begins and the other ends. Against all such reasoning, and in favor of the exudation arising from the membrane itself, it may be said that, as regards the endocardium, there is the statement that vessels do extend into it, and that parts of the mitral valve have been actually injected,—but of this I confess some doubt. It has been also said, that since, as in rheumatism, there is an inflammatory disease and its actual products seen, as in pericardium or pleura, that, therefore, it is probable that a similar affection should occur within; but in answer to this it may be said, that the pericarditis is a consequence of some previous condition, and that a full consideration of rheumatism would lead us rather to believe that the affection is in the blood, and that it is the increase of fibrin in this fluid which causes it to coagulate on any obtruding points of its course, for it is only those parts which project into the arterial current which are involved. I have thus briefly placed this question of inflammation of the lining membrane of heart and arteries before you, with the main reasons for and against the supposition of its existence, as I prefer not to speak dogmatically on a subject about which so many men of eminence are not agreed. My own opinion is, that the truth lies between the theories I have given, not because I think a medium course between two opposite views is necessarily correct, for I would warn you against this easy mode of argument (the splitting the difference, as it is called), and thinking you are nearer the truth because you place your opinion midway between two others, a process most unphilosophical, seeing that the tendency of one alone may be towards truth, but not reaching far enough. In the present instance, however, I think the most correct estimation of the statements I have laid before you is, that there is some truth in all of them. I am convinced in my own mind, that a large amount of the deposit seen in vegetations in the heart and within the bloodvessels is derived from the fibrin of the blood, and more particularly so if this fluid be overcharged with it, as is generally the case when such concretions are found attached to those parts which project into the current. This latter fact, of the obtruding parts being those principally on which the deposit rests, shows how greatly other causes obtain in considering the question of vegetation, besides that of mere inflammation of the membrane. I quite think that a diseased condition of the blood, whereby an increase of fibrin is present (or of that albuminous material which exists as fibrin when seen by us), combined with some impediment in the current of the circulation, is all-sufficient to produce the large soft vegetations; but, granting this, I do not see why the membrane should not be also affected, why the subserous tissue should not pour out a lymph which should penetrate the inner coat, and appear as an exudation. That a change can take place in this membrane allied to an ordinary inflammatory one, there can be no doubt, as we see it thickened and of an opaque white color in a heart that we know has been affected during a rheumatic attack; also, I consider we must make a difference between the soft large vegetations hanging from the valves and small, hard, translucent granulations, which are much more likely to have arisen within the structure itself. I think, then, it is highly probable that a certain change may take place beneath the serous surface, and an exudation occur (one proof is in the fact just mentioned of the opaque and thickened membrane so often found throughout the whole cavity of heart), and that, in consequence, any rough spot so produced would be in a condition to collect the fibrinous deposits upon it. Whenever, then, we find a fibrinous concretion in the heart or bloodvessels non-adherent, we may consider it due merely to a coagulation of the blood, and this owing, probably, to an increase of the fibrin, as well as to a mechanical cause for its deposition;

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[1] 1449^{70}. [2] 1399^{50}.

but when found adherent to the interior of the heart and valves, and cannot be separated so as to leave a clean surface behind, we may consider the membrane itself affected. It might be asked, what does the microscope teach? Why, it shows in the softer matter merely fibrillated material, with granular nuclei, while in the firmer vegetations on the valves, nucleated fibres lying side by side, as you see in this drawing. Time will not allow me to prolong the discussion of this matter, which is one of the most interesting in which modern pathologists are engaged—that is, the relation between the blood and the containing vessels, both in health and disease; also, the influence of morbid conditions of one upon the other, the precipitation of the ingredients of the blood, concretions, and the blocking up of the smaller vessels by their detachment.

If it can be shown that the endocardium can be the subject of inflammation, why, then, similar changes will occur in endocarditis as in other serous membranes, and especially in the valves, if they are vascular, as has been stated. The first stage would be an *hyperæmic condition* of the bloodvessels, producing a redness or injection. This state, if it exist, could scarcely ever be witnessed, as it would have long passed away when a fatal result ensues. I allude to it, however, to warn you not to mistake for it the redness produced by post-mortem staining, which is due to the imbibition of the hæmatine or coloring matter of the blood, and looks as if the interior of heart or artery had been brushed over with a red paint, whereas, in true inflammatory redness, the capillary vessels themselves are seen producing the color. This difference between mere red staining and a vascular redness should be carefully studied, and this you can better do on a serous membrane. I know that a mere discoloration has often led to the belief of arteritis. *Opacity* would result, as in other serous membranes, from any exudation in the membrane or beneath, and may be taken as evidence of an inflammatory change. *Softening*, in like manner, if the inflammation be recent, would be met with and due to the fluid secretion, whereby the serous membrane and other coats become readily separated. *Exudation.*—It is probable, as before said, that the large vegetations and concretions found on the valves are mostly formed from the fibrin of the blood, yet it is true that an exudation may occur producing a roughened state of the membrane, and even those hard, small granulations sometimes met with on the valves.

Chronic inflammation, or the results of acute inflammation, are especially to be seen in the opacities and thickenings of the endocardium. It should be remembered that this membrane differs in structure in different parts, that it is transparent in the ventricles, and recognizable only by the polish it produces on the interior, while in the left auricle it is an opaque structure, and which would be evidence of disease if it existed elsewhere. Sometimes, as a consequence of inflammation, the whole interior of left ventricle is of an opaque white color and thickened, or this occurs only in patches, or the covering of the muscular trabeculæ is affected, and, if the latter be small, their whole thickness may be converted into fibrous structure; the septum, at its upper part, is often seen to have a white patch, or sometimes a raised fibrous band, running across beneath the aortic valves.

VEGETATIONS.—As a result of acute endocarditis, we have already considered this subject; but we find, also, similar bodies connected with the valves which have long been the subject of disease, and not evidencing any signs of inflammation, being found here as they are in all parts of the vascular system where any roughened surface exists. In these instances, however, the vegetations are usually of the soft, friable kind, and not those hard, semi-translucent, closely adherent granules which appear to be more the effect of an acute inflammation, for in cases of rheumatic pericarditis of three or four weeks' standing, and where, after death, it has been seen that the endocardium is also affected, we may find nothing more than a few minute bead-like granulations on the valves. To these may be attached the softer material, which evidently arises from the blood, and it is this alone which is often seen connected with disorganisation of the valves of long standing.

VALVES.

INFLAMMATION.—The remarks already made with respect to the inflammation and deposits on endocardium apply also to the valves; but in the latter case they require a special consideration, seeing the importance of the parts that are affected. If inflammation attacks them, the various processes will be undergone, as already seen; as regards the first, or a hyperæmic condition of the valves, its existence is highly problematical, and you must be cautious, as already said, to distinguish between the blush of inflammation and the mere discoloration by the blood.

Exudation and softening, leading to laceration, perforation, &c., occurs as in other inflamed textures, and they are in the present instance very important to recognize. During chronic changes in the valves, and more rarely during acute, various destructive processes may occur, causing tearing or perforation of the parts affected; but as the condition so produced is so altered when the heart undergoes visual examination, it is difficult to say when such accident occurred, and whether as a result of other changes found, or altogether preceding them. There can be little doubt that such lacerations occur at the commencement of a disease which may continue during many years; but it is generally believed, and no doubt with truth, that some morbid state, or an endocarditis, must have preceded the laceration; for it is still a debated question whether a healthy valve can undergo any injury. Cases are constantly coming before us where the history is that of a sudden affection arising from violence; but we can never be quite sure that the valve at that time was healthy, and the question still remains, whether any violent exertion or great mental emotion may so overexcite the action of the healthy heart as to cause a rupture of any of the valvular apparatus. I think, though not frequent, it sometimes happens, both because occasionally such laceration may be met with without any great evidence of disease, and also because, now and then, the history of the patient scarcely admits of any doubt as to the integrity of the part when the accident occurred; for instance, one or two of the tendinous cords of mitral may be found loose, or an aortic valve may be lacerated, in a case which has been speedily fatal following such an injury. In two cases, during this last year, we have seen in the post-mortem room, death arising from incompetency of the aortic valves, where this was due to two of these valves being torn away from their attachment, as if the fingers had been placed within them, and at their point of meeting a forcible tearing from the aorta had been produced, leaving a bare place above them; in one of these there was a history of such an accident having occurred. Only lately, too, I saw a gentleman who died, after many years' suffering, with aortic valvular disease, and where the valves were extremely disorganized; and the history which the patient gave, and always persisted in, was, that he was in perfect health until he received a violent mental shock, owing to an accident to one of his children; that his breath went, he had violent palpitation, and he thought that he should die; and that a medical same thing may occur in *adult* life as a result of inflammatory adhesion. I have here four hearts: in one you see two valves united as far as their middle, but yet the two free edges can be seen; in this one you see a perfect blending of the adherent sides, and the united structure has sunk down below the level of the valves; in this third specimen you might imagine you were still looking at the same at a further stage, for it exactly resembles it, only the uniting partition is much less, and scarcely divides the large valve into two; while in this fourth heart, you see a large valve with only a trace of partition at its bottom, and thus two valves have been formed out of three. Here is a pulmonary artery[1] with two, and here a good specimen of aorta[2] with only two valves. *Supernumerary valves* are often formed in like manner. Thus, owing to an inflammatory adhesion, the free edge of the valve becomes fixed to the aorta, and thus two valves made out of one, producing four in all. This supernumerary one is much smaller than the others.[3] Where the valves present quite a healthy appearance, and are uniform in size, it might be a question whether the excess arises in the way mentioned; but since four valves are much more frequent in the pulmonary artery than aorta, and as the former appears more susceptible of disease in uterine life than the latter, the regularity of the valves may be owing merely to the circumstance of the early period at which the adhesion takes place, and when all the parts are plastic. Such perfect pulmonary and aortic valves you may see in these specimens.[4] In the heart of the girl I just showed you, with deformed aortic and pulmonary valves, you will see also that the mitral is malformed: this is rare.

COAGULA, POLYPI, EMBOLI, &c.

I have already said, in speaking of endocarditis and vegetations, that excepting the firm, grey, small, and hard granulations, which might have an inflammatory source, nearly all the concretions found within the heart and bloodvessels arise merely from changes in coagulated blood. Concretions within the heart are called polypi, and various forms are found; they do not correspond, except in very rare exceptional instances, to polypi in other structures which are true organized growths. *Emboli* is a term recently given to denote

[1] 1413^{17}. [2] 1413^{80}. [3] 1413^{20}. [4] 1413^{45}, aortic; 1413^{36}, pulmonary.

fibrinous concretions found in the bloodvessels, but not originally in the part, being carried there from a distant source.

The coagula, polypi, or hollow concretions, you are all familiar with, as constantly met with in hearts which are diseased—that is, in those where the cavities being enlarged, the blood is retained, moves with difficulty, and coagulates during life as it naturally would at death. Having thus coagulated several days, or more, before dissolution takes place, changes occur which produce the appearances here seen. This coagulation occurs in all the cavities, but especially in that (whichever it may be) where the blood is most retarded, and in those parts away from the orifice where the current is less strong; thus it takes place in the corners of the heart, in the apex of the ventricle, in the auricular appendage of the auricle, and especially among the muscular trabeculæ. Thus in these corners of the heart large concretions may be found, or among the muscular cords as innumerable small polygonal masses fitting into the spaces between them. The surface of the polypus towards the ventricle, where the blood is still freely circulating, is always round, and thus, if it be formed at the apex, and the latter should be blunt, it will be almost globular. As soon as the coagulation of the blood takes place, changes occur within it; thus the coloring matter is removed, leaving the concretion sometimes perfectly white, by which it is immediately recognized; at the same time the interior is softening, and thus in the course of a few days, if death occurs, the concretion when opened is found to contain a thick fluid resembling pus. The microscope shows this to contain only molecular matter, and no cells, and, therefore, differs from true pus. If met with earlier, before the decoloration has taken place, the concretion is still of a pink color, as well as the fluid within. When the latter is discharged, of course a cyst is left composed of fibrin. You will see here several hearts containing these ante-mortem clots, from which the interior fluid matter has escaped, leaving the cyst *in situ*.[1] These hollow sacs have received various names, as globular vegetations, concretions, &c. They are large and rounded when formed in lower part of ventricle; smaller and polygonal when formed in muscular meshes. The fact of the interior of a softened clot containing matter which could not by the naked eye be distinguished from pus, led observers formerly to suppose that pus might be carried into the heart from a distant part of the body; but it is surprising

[1] $1395^{12}, ^{28}, ^{86}, ^{90}$.

that such an opinion should have ever obtained respecting such concretions in the heart, however it might be thought to hold good in the bloodvessels, seeing that they are never found in cases of pyæmia, but only in those instances I have mentioned, where, owing to an impediment in the circulation of the blood through the heart, coagulation has taken place before death: they are thus scarcely ever seen, except in cases of heart disease and enlargement of the cavities. In persons who are dying during several days with heart disease, these coagulations may be expected.

True Polypi.—The concretions already spoken of have erroneously been called polypi, but there are true polypous growths in the heart, although these are rare. I have only these two specimens to show, and both are growths in the left auricle springing from the septum near the fossa ovalis. In this old preparation[1] you will see a polypus semitranslucent like a mass of size, and which was injected through the coronary artery, although the vascularity is not well seen now. This other heart[2] came from a woman who was in Charity-ward a few years ago under Dr. Addison for hemiplegia; after death a growth was found in the left auricle, and nearly filling it; it is of an oval form, as you see, and grows from the auricular septum. It consisted of nucleated fibres, and might, therefore, be called fibrous, or fibro-plastic, and when freshly cut I remember that it was distinctly vascular.

Emboli and Impaction of Bloodvessels by Fibrinous Concretions.—This subject has only of late been studied, and the first observations had reference to cases of rheumatic endocarditis where, during the progress of the disease, the patient was suddenly seized with paralysis, and which was found, after death, to be due to the plugging of a cerebral vessel by a mass of fibrin corresponding to the vegetations of the heart, and whence it appeared to be carried. These were the most striking instances observed by Kirkes; and further observations by Virchow and others have made it appear that other bloodvessels may be similarly affected, as those of a limb; when gangrene necessarily results. It was from the carrying of the fibrinous plug from one part to another that suggested the term *emboli*, and thus the gangrene so produced has been called *gangrena embolica*. This might also occur, not only from the fibrin being carried from the heart, but from one part of an artery to another, when a coagulation has occurred in it, either from disease or from

[1] 1388. [2] 1396^5.

aneurism. It has also been thought that similar effects have arisen from plugging of arteries, due to some pelvic inflammatory process in connection with parturition. Also, that disease of the lung might infect the blood in the pulmonary veins, and so the arterial blood generally be contaminated. Also, that in the local circulation of the pulmonary artery these coagula might arise, or be carried into the lungs from a distant vein, and be a cause of sudden death. I mention all these instances, and I might still more, for it is the fashionable pathological subject of the day; but I do so *not* that you may be always searching for such causes of disease, but rather to warn you against being too hasty in finding them; and I do this with all due consideration, for now, during several years that attention has been drawn to the subject, I have examined several hundred dead bodies, and have very rarely met with a good example of the affection; and you can easily see what care is required in determining the nature of the morbid condition, for plugging of a blood-vessel by no means indicates at once what pathological process has been in operation. In the first place, you have to determine between an ante-mortem clot and a post-mortem clot, but this is easily done; the great difficulty is, when a firm fibrinous plug is found in a vessel, and associated with disease of the part which it supplies, to know which is cause and which is effect—whether the plugging has caused the decay of the tissue, or whether a primary disease in the tissue has not necessitated the obstruction to the circulation, and the consequent coagulation. Again, the cause of the obstruction may be altogether local; thus, you may constantly find softening of the brain, and the vessels leading to it diseased and full of old fibrinous coagula; now, even if these preceded the softening of cerebral tissue, they were, no doubt, formed at the very spot, from the diseased condition of the artery, seeing that there has been no affection of the heart to account for them. I do not wish to doubt the accuracy of the cases first observed, for they seem unequivocal, but I cannot deem them otherwise than rare, since I have never yet met with a well-marked example. To remind you how careful you should be, I will call to your remembrance the case of the girl who was, a short time ago, in the clinical ward with rheumatic endocarditis, and who was suddenly seized with hemiplegia, and died. The case seemed clearly one in point, both after death as well as before, for vegetations covered aortic and mitral valves, and impacted masses of fibrin existed in spleen and kidneys;

and yet, on careful examination, it was found that an aneurism had burst in the middle cerebral artery. So also, in another case, where the arm was involved in conjunction with heart disease, an aneurism of the axillary artery was detected. Another case occurred a short time ago, in which it was thought that a vegetation had been carried to the spleen; the case was one of endocarditis, accompanied by what is often seen, a fibrinous mass in that organ; in this instance it had softened, and the splenic artery contained a fibrinous plug: the question arose, was the latter carried there, causing obstruction and softening of organ, or did not the softening which sometimes occurs in these deposits necessitate the coagulation in the vessel? I do not, I say, wish to deny that such moving of coagula occur; but I am convinced that, in the novelty of the subject, many inexperienced persons have altogether mistaken ordinary morbid appearances, and been led into error, and I think I take away no credit from the observers I have mentioned, when I state that the detachment of a clot in a diseased bloodvessel, or aneurism, has been long recognized as cause of stoppage in a vessel further distant. Thus, several years ago, I remember the case of a man who, with carotid aneurism, had the internal carotid obstructed higher up, and which was then attributed to the loosening of a clot. Also, you will see, by referring to a paper written by Dr. Hughes, twenty years ago, in the *Guy's Hospital Reports*, that he quotes a case from Legroux, where a woman was suddenly seized with loss of power in the left arm, followed by gangrene and death in eighteen days; when the brachial artery was found filled with fibrin, exactly corresponding with a similar clot in the left auricle. I may also again speak of this case of polypus which I just now showed you, for the sake of alluding to the sudden attack of hemiplegia with which the woman was seized. In cases of gangrene of the extremities arising from diseased arteries, a detachment of fibrinous clot is, no doubt, very often the immediate cause of the stoppage of the blood. I therefore by no means ignore the movement of clots, though many mistakes no doubt arise, and this especially in connection with the pulmonary artery. It is thought that coagulation occurs in this vessel during life, and the fibrin may be detached, and, obstructing the smaller vessels, lead to death. This I believe to be rare, excepting in well-marked cases of disease of the vessel or its valves, and yet we are constantly reading of coagula in pulmonary artery causing death; in two instances where this was said to be the case, the clot was merely the ordinary post-mortem coagulum, and in many of those of which I have read I have no doubt the same explanation might be given. For you should remember that whatever causes an impediment to the circulation will necessitate a coagulation in the pulmonary vessels; and thus, as in the case of bronchitis you saw the other day, I was able to pull out long strings of fibrin from the lungs, forming a kind of tree. Such coagula are not uncommon, either in pulmonary artery[1] or vein.[2] In cases of disease of the heart, and especially where the lung is apoplectic, such fibrinous concretions may be found, and sometimes even coagula which have evidently been formed before death; but, then, this is to be attributed to the previous stagnation in the tissue; the same may also occur in pneumonia. I think, therefore, that in many cases the clot found is simply post-mortem, and, even where it is ante-mortem, it is consequent on an affection of the lung, to which it is altogether subservient, and, therefore, comparatively unimportant.

You should remember that the right side of the heart, and the vessels leading from and thereto, contain naturally, after death, a coagulum such as would form in a basin during venesection. Thus, as the body lies on its back, the red corpuscles sink down and the fibrinous clot forms above them, and thus in right auricle and ventricle it is found, white or buff anteriorly, and red posteriorly; and connected with these clots in the auricle are those proceeding from vena cava and jugular vein, and from pulmonary artery with its branches: the shape of the valves being modelled upon the latter. On the left side the blood is rarely coagulated, the auricle being filled with a dark semifluid blood, and the ventricle with a small quantity of the same, a coagulum, if found within it, being very small. Also, it is more rare to be able to detach branching coagula from pulmonary veins. Why the blood should be dark and scarcely coagulated on the left side is yet unexplained. In diseased heart with dilated ventricle, we may find a large softish clot, but seldom so well formed as on right side. If we discover anything unusual in these clots, we shall more rightly regard them as the *consequence* of a peculiar mode of death, than as the cause of it. If a clot forms before death, it can generally be told from the fact of its being firm, adherent to walls, having lost its color, and when opened, softened in the centre.[3] A little experience will enable you to distinguish

[1] 1450^{57}. [2] $1520^{28, 32}$. [3] 1450^{40}.

them; by the same means you will be able to distinguish an old clot from a recent one in a small vessel, as the cerebral to which I have already alluded; but it is not always easy to say whether a fibrinous concretion has been formed in a vessel, or whether it has been carried from a distant part. If it be supposed to have been brought from the heart, it must be compared with the vegetations there found; and its shape, and the mode in which it is placed in the vessel, will show whether it has been formed there or not. Moreover, if a coagulation occur from disease in the tissue, all the vessels leading to it, up to a certain sized branch, will be found filled; whereas, if the fibrinous plug be carried from a distant part, it will lodge at that spot where its progress is arrested, and the smaller vessel beyond will of necessity be found empty. Under the head Kidney and Spleen, I shall have occasion to speak of fibrinous masses found in them in connection with heart disease, and which have been thought to be due in like manner to some portions of vegetations carried from the valves; they are more frequently found in connection with such vegetations than not, but very often in cardiac disease without such vegetations, and, therefore, the theory in this case is doubtful.

A very interesting class of cases connected with this subject has been mentioned by Simpson, where during the puerperal state there is a disposition for clots to form in the arteries, and thus gangrene of an extremity sometimes takes place; or a coagulation in the pulmonary artery; whereby sudden death may take place, and thus is afforded an explanation for an occurrence which is sometimes witnessed.[1]

This table is one which hangs in the post-mortem room, and which I have exchanged for the old one of Bouillaud. The measurements are taken from a great many examples; and I have given them in inches instead of in French lines, as by Peacock and others; they are in consequence, perhaps, not quite so accurate, but you will be better enabled to carry them in your memory.

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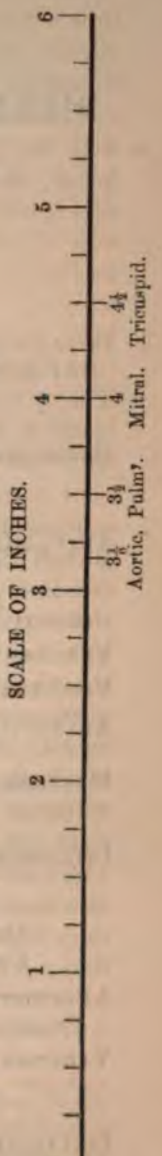
[1] The following case not long ago occurred, and the question arose whether gonorrhœa could be the starting-point of such an affection. A lad under Dr. Habershon, for a slight pneumonia, died suddenly; he also had an acute gonorrhœa. After death the pulmonary arteries were plugged, the vena cava at junction of iliacs had a large ante-mortem clot, and the internal iliac vessels were also similarly filled with clot, and especially the vesical. The bladder was inflamed, including prostrate, urethra, &c. If this had been a woman, and a puerperal case, it would have been clear; but it was not so evident that a gonorrhœa could have caused the local phlebitis, although a gonorrhœal rheumatism is recognized, and sometimes even a more violent pyæmia, arising from infection of the blood from this cause.

MEASUREMENTS OF HEART.

Circumference at base . . .	9 inches, or rather more
Length	rather more than breadth
Circumference of R. ventricle .	5 inches, nearly
Length of right ventricle . .	3¾ inches, about
Thickness of walls of L. ventricle	½ inch, about
,, ,, R. ventricle	1-6th inch, about
,, septum ventriculorum	intermediate between two above
,, left auricle	⅛ inch, about
,, right auricle . . .	rather less than left
Orifice: L. auric-ventric. (mitral)	4 inches in circumference
,, R. auric-ventric. (tricuspid)	4½ inches, or rather more
,, Aortic	3 1-6th inches
,, Pulmonary	3½ inches



It will be seen that the tricuspid orifice is larger than the mitral, the mitral than the pulmonary, and the pulmonary than the aortic. The pulmonary larger than the aortic by ⅛ part, and the mitral larger than the aortic almost by ¼ part (being ¾ inch larger) and the tricuspid is half as large again as the aortic.

These measurements were made by this graduated cone, which being inserted into the orifice, the line at which it is stopped is read off as the size of the opening; when there is much rigidity, and the valves have lost their pliancy, the instrument is useless; you must then lay open the orifice and measure across by a graduated tape, taking care to fit it into all the inequalities.

As regards the capacity of the cavities, each probably contains about three ounces of blood; but it is by no means certain, as some maintain, that the right is more capacious than the left: it is said, too, that the ventricles hold more than the auricles. The weight of the heart is about 9½ ounces; this is the average taken from all our cases during three years; as these are mostly cases of chronic disease, and the manifestly enlarged hearts are excluded, it is probable that in healthy persons the weight may be somewhat higher than this. In wasting diseases it weighs sometimes as low as four or five ounces; or in hypertrophy may reach to 2½ pounds; in the latter cases, the wall of the left ventricle may measure an inch or more in thickness, and the septum participates in the changes of the ventricles.

DISEASES OF THE ARTERIES, VEINS, AND LYMPHATICS.

ARTERIES.

- Inflammation . (Arteritis)
  - Acute ....
    - Various stages, as in preceding Table.
  - Chronic ...
    - General
    - Local ..
      - Obliteration, closure, &c.
- Degeneration .
  - Atheromatous, calcareous, &c.
  - Various arteries, as coronary, cerebral, &c.
- Aneurism ....
  - True .....
    - Fusiform.
    - Sacciform.
  - Spurious ..
    - Diffused.
    - Aneurismal varix.
- Dissecting Aneurism.
- Varicose or Dilated Arteries.
- Vascular Growths .... Nævus, or teleangiectasis.
- Adventitious Growths.

VEINS.

- Malformation.
- Inflammation .
  - Acute ....
    - With infiltration and thickening of coats.
    - Obliteration of vessels.
  - Chronic ... Ditto.

Dura mater sinuses. Vena cava. Portal vein.
Umbilical vein. Uterine veins, &c.

- Adventitious Products ...
  - Cancer.
  - Phlebolithes and ossification.
- Varicose Veins Varicocele ... Hæmorrhoids.

LYMPHATIC VESSELS.

- Inflammation.. Various stages of absorbent inflammation.

LACTEALS.

Dilatation .... Obstruction ... Cysts ... Tubercle.

THORACIC DUCT.

OBSTRUCTION . .	DILATATION.

LYMPHATIC GLANDS.

INFLAMMATION. .	Enlargement . . .	Suppuration, &c.
HYPERTROPHY.		
ADVENTITIOUS PRODUCTS . . .	Lardaceous and fibroid. Tubercle and cretification. Cancer. Melanosis. Pigment (bronchial). Typhoid (mesenteric).	

ARTERIES.

INFLAMMATION, OR ARTERITIS.—With respect to this disease, the same remarks, for the most part, apply as to endocarditis; that is, as to the possibility of the inner surface of the vessel being inflamed in the ordinary sense of the word, and an exudation taking place from it Experiments on bloodvessels have failed in producing those well-marked phenomena of inflammation which are seen in ordinary serous membranes, and thus, in those cases where a vessel is found filled with fibrin, adherent to the walls, the question arises, as before, how much of this is due to a mere coagulation of the blood, or how much to an exudation from the surface. In many instances of well-marked inflammation of the arteries, all the coats are involved, and, as these are vascular, we find lymph, pus, &c., formed within them, and at the same time a coagulum is met with in the interior of the vessel; in such a case as this the latter, no doubt, contains some inflammatory exudation. These well-marked cases of inflammation, however, are generally confined to particular spots, arising from local causes, as injuries, or to the neighbourhood of sores, sloughs, &c.

Acute general arteritis, as described by some authors, is, I think, excessively rare, as I have never yet witnessed such an affection. It has been described, like inflammation in other parts, attended by redness, exudation of lymph, &c.; but I need only to ask you to remember what I have already said of endocarditis, to make you familiar with my views on this subject, and not to mistake a mere redness due to imbibition of coloring matter for an inflammatory blush, or a mere fibrinous plug, which you find after ligature of a vessel for an exudation. In this case, however, there can be no doubt that at the line of ligature some inflammatory exudation does take place, for the inner coat being lacerated, an effusion of lymph occurs beneath, and which, being poured out and mixing with the fibrin, forms a plug, which subsequently uniting with the coats of the vessel, renders it impervious; the whole at a further stage withering into a fibrous cord.

A *general chronic arteritis* is also rather problematical, unless we use inflammation in a general sense in reference to those cases where thickening and obliteration of vessels are met with. For instance, a girl was lately in the hospital in whom no pulsating artery could be felt in any part of the body, and this had been coming on for some years; after death, all the larger trunks were narrowed or obliterated.

A *local chronic arteritis* is more common, still meaning by the term arteritis an affection of all the coats; for inflammation of the inner coat alone, I say, is problematical, though chronic changes may occur in it. Thus, a thickening of all the coats to which the term inflammation may be applied is found in vessels supplying various organs undergoing degenerative changes, as in the kidney. The most important place for this to occur is the aorta, especially the arch, where the induration and loss of elasticity is attended by impairment of function, leading sooner or later to death, and this is called *aortitis.* Thus you will see in this specimen, that all the coats of the ascending aorta and arch are exceedingly thickened, the external cellular coat is changed into a tough fibrous tissue, and the middle coat is also very much increased in size; the alteration from the thin normal texture of an aorta is very remarkable, the vessel feeling rather like a piece of leather. As in this case there had been a history of pericarditis a few years before, I think it most probable that the inflammation spent its virulence on the base of the heart and the roots of the bloodvessels, and that the disease thus began, became chronic, and extended upwards until the whole of the arch was involved. Lesser degrees of the same affection are constantly met with, and generally in hardworking men, who use great exertions with their arms; in such the aorta is very likely to undergo alterations, both as regards dilatation and chronic inflammatory changes of its coats. It is not clear whether such exertion produces any tension externally on the vessel, or whether during long inspiratory efforts the blood exerts any undue pressure on the interior of arterial walls, *i.e.*, whether the affection be due to any mechanical influence external to vessel, or whether through the medium of the blood within; whichever be the method, however, it is well known that certain changes result from such violent exertion in this class of persons. Such chronic changes, in a slight degree, are often seen commencing just above the valves, as you see in this drawing.[1]

The most common changes in the arteries are those which are called *degenerative*, due to the deposit of *atheromatous* or *calcareous* matter on the vessel. The earliest changes occurring in the body from age appear to be the deposition of these small white specks of matter on the inner surface of the bloodvessels. These white patches are slightly raised, as you can tell by passing the finger over them, and smooth, for they are beneath the inner membrane of the artery; if this be torn off, the material is exposed, and found to be a white, soft, fatty-looking matter, and hence the name *atheroma:* when examined by the microscope, it is seen to contain a quantity of fat globules, and amongst these, numerous plates of cholesterine and amorphous masses; the latter consist of earthy ingredients, as carbonate and phosphate of lime, hence the effervescence when an acid is placed upon them. In the commencement of this affection, you may notice it first in the ascending aorta, also in the thoracic aorta near the intercostal vessels, and lower down at the bifurcation.[2] When the aorta is much diseased, large layers of it may exist beneath the inner coat, and this is best observed by making a transverse section of the vessel, when the white, soft matter is seen constituting, as it were, another coat beneath the inner one. In these extremely diseased aortæ, you may see raised patches of much firmer consistence, which, when examined, are found to consist of a fibrous tissue; this results, probably, from a chronic inflammation of the coats of the vessel, as I just now mentioned.

In extreme disease of the bloodvessels, we find calcareous changes, as you may see in these several aortæ;[3] or complete ossification of the smaller arteries, as you see in this femoral, which forms a complete bony tube.[4] In the aorta this complete ossification does not occur, but distinct bony plates form in the coats, in the room of the atheroma before mentioned; at first, the lining membrane passes smoothly over them, but in course of time this gives way, and the calcareous mass projects into the bloodvessel, and thus the whole surface presents a rough or jagged aspect, with fibrinous coagula clinging to the edges of the plates. You will see on our shelves several specimens where the aorta and larger vessels are thus affected. In less severe cases, the arch is principally involved, and the end of the vessel where the iliacs are given off; this is a very favorite seat of disease. As a consequence of this destruction of the inner coats, the blood coagulates on the roughened surfaces, and insinuates itself behind them, producing, in particular spots, the affection known as dissecting aneurism. In consequence of a fibrinous coagulum then forming, the inner coat becomes pushed inwards, and so a complete stoppage of the circulation may occur. In this specimen,[1] you will see the aorta so obstructed, causing gangrene of the extremities; and in this one,[2] there are two distinct obstructions, one above and the other below the diaphragm. In this one,[3] also, you will see complete obstruction at lower end of aorta; the coats have separated, a fibrinous concretion has taken place within and between them, and thus a stoppage of the circulation at this spot. In some cases, the vessel may rupture and blood break through, causing instant death;[4] and this has also happened, though rarely, in a limb. It is not so common, however, as the blood running between the coats. I believe it was the contemplation of such cases as I have shown you which first suggested to Sir A. Cooper the possibility of putting a ligature on the aorta. This calcareous degeneration of the vessels necessarily gives rise to disease of the organs which they supply, and thus the cause of gangrene of the legs in old persons. In vital organs, as heart and brain, such degeneration of bloodvessels is very important, for I have already said that fatty degeneration of the heart is associated very often with ossification of the *coronary* vessels. These arteries often change into complete bony tubes, so that by placing the fingers within and without the heart, they may be clearly felt in their course.[5] If the bony deposit is very excessive, a closure may occur in various parts of these vessels, and it is not uncommon for their openings into the aorta to be very narrowed. In allusion to this, I may also show you this specimen, where the larger trunks given off from the arch of the aorta are quite closed.[6] The *cerebral* vessels are very liable to disease, and the consequences are often fatal, as leading to rupture and sanguineous apoplexy, or softening. Thus, on examining a brain so affected, we often find the basilar artery changed into a bony tube, or its walls occupied by bony plates, also the carotids in the same condition, and the various cerebral vessels, leading from these into the substance, rigid, and occupied by earthy plates and granules. Much of this degeneration is also of the atheromatous kind, for, if some of the minuter branches be examined by the microscope, the walls will be found full of fatty granules; and here I must warn you not to mistake such a condition for a mere accretion of globules on the exterior of the vessels; for example, in cases of inflammatory softening of the brain in young people, if the capillary vessels be examined by the microscope, they will be seen to be covered by numerous fat globules; these come from the brain substance itself, and are external to the vessels.

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[1] 41^{13}, drawing.

[2] 1455^{25}.

[3] 1456^{10}, &c.

[4] 1518^{50}.

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[1] 1465. [2] 1473. [3] 1475. [4] 1452. [5] 1500^{35}, ^{64}. [6] 1501^{85}.

Disease of other arteries is attended by lesser consequences. An ossified, very tortuous, splenic artery is not uncommon, but the other visceral arteries are less frequently affected.

It is scarcely necessary to tell you that the terms cartilaginous and osseous, so often used to denote changes of structure into hard tissues, are used merely in a general sense,—that many substances look like cartilage and bone, but that neither of them are actually present. Thus, in these hard plates and ossification of arteries of which I have been speaking, no true bone exists; and this is the same in all the cretifications connected with the heart and arteries (and so unlike those of the cerebral and spinal membranes, which I shall soon mention), that no true bone is ever found. If you take one of these hard plates from the aorta, and grind it down so that it will form a fit object for the microscope, you will see no lacunæ or other constituents of bone, but merely a number of round masses, disposed in a matrix of fibrous tissue. If an acid be added, the rounded earthy portions will be dissolved out, leaving the fibrous network. It has been stated that the appearance thus represented exactly corresponds to an early developmental stage of dentine, and the coincidence has been considered very remarkable; however this may be, I see nothing extraordinary in the mode of formation of these earthy deposits or cretifications of the arteries, since they consist simply of a delicate fibrous tissue, holding some earthy matter in their meshes: a most simple form of structure.

A very common form of disease seen in the arteries of the trunks consists of a corrugated condition within their interior. The surface, instead of being smooth, is raised into a number of circular folds, giving it this rough or uneven appearance. I have seen it in the artery of a stump when the vessels elsewhere were healthy, and it is a form of degeneration.[1]

ANEURISM.

Although you all, no doubt, understand what is meant by an aneurism (a sac communicating with an artery), yet the term is somewhat difficult to define accurately; and this not so much on account of any obscurity in the disease itself, as because authors have adopted such various names in connection with it, and sometimes the same terms in opposite senses. This is especially the case with reference to the terms *true* and *false*, which so puzzle students, owing to the different modes in which they are used; and yet, in most cases, having reference only to the number of the coats of the bloodvessel which may be involved. There are, also, various names denoting the form and size of the tumor. First, with respect to the terms *true* and *false*, and the manner in which they have been used. Scarpa, one of the earliest writers on the subject, from failing to find all the coats of the vessel in most aneurisms, described those as true where some of the coats were wanting, and which also contained coagula; and this definition is, for the most part, correct; whereas he called that a dilatation, or false aneurism, where all the coats remained, and no coagulation had occurred. Now, it is remarkable that the very opposite terms have been given by many authors to the same conditions, and they have called that true where all the coats were perfect, and that false where some of the coats were wanting, evidently being influenced by the connection in their own minds of true with perfect and false with imperfect. Scarpa's ideas were evidently correct, for he was looking, no doubt, at two forms of disease of the aorta—the one where the whole vessel and arch was dilated, and the other where a small pouch came off from the side of the vessel. No two affections could be more different. The one case interfered with the circulation and the heart's action, while the other produced effects merely by its pressure or mechanical effects on surrounding parts, as an ordinary tumor; the one consisting, as Scarpa truly says, of all the coats, and containing no coagula, while the other, if of any size, is deficient in the coats, and contains coagula. Although he was so far right, it was incorrect to give the name true aneurism to that only where the coats were deficient, for in the early stage of an aneurism, and when small, all the coats may be found; we should therefore, by following Scarpa rigidly, be obliged to give some other name to a disease to-day which to-morrow might be an aneurism; for, in the first instance, when a pouch forms from a bloodvessel, all the coats of the artery are intact, but when it has reached a certain size, the middle coat becomes stretched and thin, and altogether disappears, leaving nothing but the inner and the outer cellular one; and at later stages the inner also disappears, or can be only traced a certain distance within the mouth of the sac. When all the coats of the artery are dilated, and the enlargement circumscribed, the term *fusiform* is used, while *sacciform* is the term applied to the commoner form of aneurism, where a pouch comes off from one side of the vessel. It is to the latter that some writers have applied the terms *true* and *false*, according as the coats forming it were perfect or not; but I think, to avoid confusion, we had better not use these expressions at all. An aneurism, then, is a large pouch or sac, formed from the walls of an artery, and communicating with it; when a distention occurs in the whole calibre of the vessel, the aneurism is *fusiform*, and consists of all the coats; when it comes off as a pouch from the side, it is *sacculated*, and consists of all the arterial coats at its commencement, but when grown larger, some of these are lost. Moreover, as there is a free current through the former, no coagulation can occur; while in the latter, the blood becomes stagnant, and deposits its fibrin in layers. If the sac be of some size, it is formed principally by the external cellular coat, the internal coat proceeding only a short distance inwards, and within this are the fibrinous lamina. These lamina are of a pinkish color, are very thin, and lie one upon another in great number,[1] so that a section resembles that of an onion. Their surface presents a remarkable appearance, from there being a series of parallel ridges upon them, resembling the "ribbed sea-sand."

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[1] 1516^{20}.

Instead of using the word *false*, I will adopt the term *spurious*, to denote that affection where a sac containing blood communicates with an artery, but is not formed at all by its coats. The term *mixed* aneurism is used by some, according to the number of coats involved, and applies to that form (if such ever exist) where

[1] 1498, 1499.

the internal protrudes through the outer two. The opening into an aneurism varies, being sometimes small, at others large, or round or oblong; this has much to do with the part of vessel affected.

As aneurisms of the aorta are the most important, I will show you some of the best marked specimens. In this one,[1] you will see a small pouch between the aortic valves, and projecting upwards between the auricle and ventricle; such aneurisms I think are produced by endocarditis where the valves are involved, and are similar to those I have already described under the term acute aneurism of the heart; for we can scarcely call a pouch between and under the valves, an aneurism of the aorta. The first aneurisms which we can say occur in the aorta, are immediately above the valves, in the sinuses of Valsalva: these are sacculated, have small openings, and generally give way before they have reached any great dimensions. Thus you see in this heart[2] such an aneurism opening into the right ventricle just below the sigmoid valves, and thus the patient's life was protracted for a considerable time. In this[3] you will see an aneurism protruding into the right ventricle and pulmonary artery, and sometimes such an one bursts into the artery. More usually these pouches at the beginning of ascending aorta rupture into the pericardium, as you see here,[4] and instant death is the consequence. On opening the pericardium in such cases, you first of all see only the serum, which has separated; but on removing this the heart is found surrounded by a black coagulum of blood, which has come through a hole at the root of the vessel. The loss of blood is not much, and, therefore, the body is not blanched, as is so often the case from ruptured aneurism elsewhere; for, in this case, death arises from mechanical interference with the heart's action, and the blood is prevented flowing from distant parts, and, therefore, the apparent anomaly, that death has been caused by a ruptured blood-vessel, and yet the tissues found congested. In like manner distinct pouches form higher up, until we reach the lower part of the arch, where the vessel meets the spine, a very favorite seat for the disease. Aneurisms take different directions according as they are situated in the ascending or descending part, and, consequently, rupture into various parts, as into the œsophagus,[5] or into the trachea or bronchi,[6] or simply press upon these organs.[7] One very important effect produced by aneurisms in this part, is due to the

[1] 1480^{35}.
[2] 1480^{55}, and drawing 41^{35}.
[3] 1478^{25}.
[4] 1478, 1478^{30}.
[5] 1482.
[6] 1480^{40}.
[7] 1489^{25}.

pressure they exert on the pneumogastric and recurrent laryngeal nerves, and in the latter case especially, a paralysis of the muscles of larynx takes place, whereby stridulous breathing and other characteristic laryngeal symptoms are produced. Thus you will see in this specimen[1] how the nerve was compressed; the symptoms were wholly laryngeal, and suggested tracheotomy, though it was not performed, as the nature of the case was suspected. In this other specimen the operation took place.[2] In some instances where a large aneurismal pouch forms in the ascending aorta, it bulges forward, and makes its way through the ribs and sternum.[3] This is the least painful form, and often unattended by any pressure on important neighbouring organs; and in the very last case you saw in the post-mortem room, the aneurism was so large that it not only penetrated the walls of the chest in front, but the spine behind. General dilatation of the arch or aneurism you may see in these specimens.[4] After leaving the arch, a very favorite seat for aneurism is where the vessel meets the spine, and is in contact with the fourth, fifth, or sixth dorsal vertebra. The aneurism may form on the front, side, or back of the vessel; though when large, very much the same effects are produced, as the enlargement takes place backwards and laterally. One of the most marked effects seen on the body as the result of aneurism at this spot, is a corroding of the dorsal vertebræ, so that when the vessel is removed, the bodies may be seen quite eaten away, leaving the cartilages projecting and unaffected. In some cases the destruction of the bones may go on to the extent of laying open the spinal canal, so that, as in this case,[5] the finger could be passed from the aneurism into the canal, and the patient, as you may suppose, had paraplegic symptoms. In such cases the wall of the aneurism has long disappeared, so that the blood within, or its coagula, are in actual contact with the spine, the wall of the aneurism merely closing-in the diseased spot on each side. In this very common form the sac is generally oval, and communicates with the artery by a long oval opening. If the aneurism should come off from the side, it soon reaches the spine, when the same effects are produced, only then the absorption is more lateral, and the ribs may be involved. Even if the aneurism be formed on the anterior part of the aorta (which is not often), it may bulge over on one side, and affect the spine in the same way. Such aneurisms may cause death, as before mentioned, by opening

[1] 1488^{70}, 1480^{37}. [2] 1485. [3] 1485^{55}. [4] 1486^{60}, 1451, 1467^{30}. [5] 1489^{30}.

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into the trachea, bronchi, or œsophagus;[1] or, not uncommonly, burst into the chest, producing sudden death; in some instances they penetrate the lung as you lately saw, and, making their way through this organ, reach the parietes of the thorax.[2] They also sometimes extend beneath the costal pleura, which thus gives them a false covering. If the parts near which they run are not actually laid open, we generally find these altered in form by the pressure, and thus we meet with a flattening of the œsophagus or bronchi, and very often disease in the lung; the immediate cause of death being pneumonia. Aneurism is more rarely met with at the lower part of thoracic aorta, and may be of the fusiform or sacculated kind. Here is one[3] showing an aneurism opposite the bifurcation of trachea, and another[4] at the diaphragm. After leaving the arch of the aorta, the next most frequent place for aneurism is where the vessel passes through the diaphragm, so that sometimes a part of the tumor is seen in the chest and a part in the abdomen; or perhaps it is more frequent a little below this spot, and near where the cœliac axis comes off; the effects differ according as it is formed from the posterior or anterior part of the vessel. If from the back, it absorbs the vertebræ as before seen; but if formed in front, a tumor projects anteriorly, and which involves in it very often the branches of the cœliac axis; these come off from the aneurism, or pass along its sides, and are compressed by it.[5] In these cases the semi-lunar ganglia and cœliac plexus are often involved, and probably produce some of the symptoms. More rarely, aneurisms of these separate vessels exist, as of the mesenteric arteries, but such are not common. I have seen aneurism of the renal artery. In the smaller trunks, or those of the limbs, aneurisms are very common, and our shelves will show you the several varieties, and the effects of tying the vessel above them, and the large anastomatic vessels resulting. We have yet no specimen where a cure has been effected by pressure, but I apprehend the sac would resemble very much those hard tumors of the popliteal in which the femoral has been tied; for the object of the surgeon is so to lessen the circulation in the vessel as to cause coagulation in the sac. Here is a remarkable specimen where an aneurism of the iliac artery burst into the cœcum, causing death by hæmorrhage from the bowel.[6] Aneurisms within the various organs are rare, except *intracranial* and *cerebral*[7] aneurisms, which are

[1] 1493.

[2] 1454.

[3] 1453.

[4] 1490^{12}.

[5] 1493^{10}.

[6] 1495^{50}.

[7] 1501^{80}, ^{65}, &c.

more common. Thus you see here specimens of aneurism of basilar and cerebral arteries. These, if small, may give rise to no symptoms until they burst, when the patient is suddenly seized with sanguineous apoplexy; or, if in the cerebral substance, softening may ensue; or, as in one of these cases where the tumor pressed on the third nerve, producing paralysis of the eye. Aneurisms occasionally are met with in the coronary vessels of the heart, and there is a specimen in St. Thomas's where a number of small aneurisms exist upon them, giving them a beaded or varicose appearance.

Spurious aneurism is a sac filled with blood communicating with an artery, but the walls of the sac not formed from the vessel itself. It is most commonly produced when an artery has been punctured; as, for example, the femoral, by a knife or sharp-pointed instrument, when the blood escapes into the tissues around, forming a circumscribed pulsating tumor. This is a form of disease which will be treated of in the surgical lectures, as there are very important points of treatment connected with it.

Aneurismal varix is where the artery has been punctured through a vein, and the two communicate: a subject also fully treated of in the surgical lectures.

Varicose or *general dilatation of the arteries* is occasionally met with; one of the most remarkable you will see reported in the medical journals of last week, by Mr. Adams, of the London Hospital, in which the patient had all his arteries, or at least those of his limbs, immensely dilated, being two or three times their natural size; and the consequence was a fatal hæmorrhage from an ulcer.

I might mention, under this head, a remarkable specimen of dilatation of the pulmonary artery, as you see in this specimen and drawing,[1] where the divisions of this vessel are dilated to an immense extent.

Dissecting aneurism is where blood issues through the inner membrane of a bloodvessel, and passes down between its coats; it has generally been thought that this occurs between the external and middle coat, but Dr. Peacock has stated that the middle coat itself is separated. The affection arises from disease of the vessel, as before named, and blood escaping through the calcareous or otherwise affected coat. These drawings refer to one of the last cases which occurred in the hospital; and I am sorry I have not the specimen, for it afforded a capital example of the affection, and I will relate it. The patient was a sister of one of the wards, and had been ailing for a year or two, when she one day was suddenly seized with fainting, became pulseless, and was apparently about to die; the heart fluttered, and she complained of pain in the abdomen. After some febrile symptoms, however, she slowly rallied, and in the course of a few days had resumed her duties, although she was still an invalid. A few weeks afterwards she was attacked in a similar way, and lay in her bed in an extreme state of prostration for two days, when, attempting to move, she suddenly expired. The post-mortem examination showed the sudden death to be due to a rupture of the aorta into the pericardium, this being full of blood. On further examination, blood was found effused in the coats of the aorta; this blood was coagulated, but recent, and corresponded in age to the period of two days, when she was attacked. The coagulum formed a thick layer between the coats all around the aorta, and thus on section presented the remarkable appearance of which you see a drawing here; the thickness of the vessel being more than twice its natural size; and this effused blood was found as low as the bifurcation at the iliacs, but I was not allowed to trace it any further. The most interesting feature of this case was the existence of a firm thin fibrinous layer of a whitish color, also between the coats, and which undoubtedly was the remains of blood effused at the first attack, some weeks before; and, what was also remarkable, the fissure through which the blood had then passed was still seen, as well as the recent laceration. The recent fissure was about an inch long, just above the valves; and through this the blood had penetrated the coats, and subsequently burst into the pericardium. In the arch of the aorta was the other fissure, about an inch long, having smooth edges, and fibres passing across it; and this evidently was the old spot of laceration through which the blood had passed in the first attack. The whole interior of the vessel was much diseased by adventitious deposit, but none was bony. I relate the case because it is a very good example both of the morbid anatomy and the symptoms which generally attend such cases. From a disease of the internal coat of the artery you may have blood passing between the coats or through them, as you see here; but in some cases, as in the one we saw lately on the post-mortem table, the blood penetrated the internal diseased coat, and again escaped into the vessel below: this occurred at the bifurcation.

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[1] 1450^{45}, and drawing 41^{54}.

Aneurism by Anastomosis, Teleangiectasis, and Nævus.—

Growths composed principally of bloodvessels, or of tissue communicating with the bloodvessels, may affect various parts, but especially the skin. They are for the most part congenital, though they may increase rapidly afterwards, and occasionally, I think, they may altogether commence at any period of life, especially after an injury. They have generally been divided into three classes, according as the capillary, venous, or arterial element prevails; and no doubt many varieties exist in this respect. Thus, sometimes a vascular growth may be seen to be full of venous blood occupying sinuses; at another, large arteries lead to it, by which a pulsation is imparted to it; and in other cases, as so often seen in nævi of young children, the vascularity is due to an increase of the smallest vessels, or capillaries. Besides these, many nævi consist of a new tissue, composed of cellular or membranous structure, forming spaces in which the blood is contained; this cavernous tissue communicating with the bloodvessels. Whether this tissue is formed from the vessels, as the veins, or is a distinct formation which subsequently becomes vascular, I think is scarcely yet made out. I shall, when coming to Liver, be able to show you some specimens of cavernous tissue in that organ communicating with the veins. A change which nævi sometimes undergo is called the cystic degeneration; thus, after their existence for a certain time, a number of cysts forms, and the vascularity is in great measure lost; it is a question often, however, to the surgeon, whether some of the cystic tumors which he sees for the first time when removed, have originally been nævi or not. Thus in this specimen, consisting of a mass of cysts now empty, which Mr. Cock removed the other day from a boy's neck, there were large bloodvessels passing into it, and filling the spaces with blood, so that it nearly emptied itself, after removal. The growths appeared intimately connected with the bloodvessels of the part, but there was no unequivocal history of its having been preceded by a nævus.[1]

INJURIES TO BLOODVESSELS.—This is a subject purely surgical, and therefore I will merely refer to this specimen of ruptured aorta.[2] It came from a man who was run over by an omnibus, which fractured a lumbar vertebra, and at the same spot the aorta was torn transversely across, by which death speedily occurred from hæmorrhage into the abdomen. The injury was not caused by any projecting bone, for the spine was not displaced.

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[1] 1649^{65}, and various specimens of nævus.

[2] 1452^{60}, presented by Mr. Roper.

Anventitious Growths.—*Tubercle* is not known to attack blood-vessels, and *cancer* never primarily. It is remarkable to see for how long a time an artery will resist all the operations of growth of cancer outside of it, and thus we often find a large mass of cancer, as, for example, in lumbar glands, with the aorta passing through its midst quite unaffected. Rarely, however, and in exceptional cases, the coats may become involved, and a cancerous nodule be seen projecting on the interior. The smaller arteries, however, are not uncommonly opened by it, and cause death by fatal hæmorrhage; but this is by a sloughing process, and not owing to the vessel being actually occupied by the carcinomatous disease.

VEINS.

Malformation.—The various deviations from the normal standard of distribution of the veins will be pointed out in the anatomical lectures; but I will show you this specimen, which I met with a short time ago in the inspection-room. In this heart[1] you will see the left brachio-cephalic vein passing down by itself at the back of the organ, to enter the left auricle separately, instead of crossing in front to meet with its fellow. This arrangement, I believe, is met with in some birds.

Inflammation of Veins, or Phlebitis.—Much that has already been said respecting inflammation of the interior of heart and arteries, applies here: it being equally uncertain whether the lining membrane of a vein can be said to inflame; experiments made to determine this question still answering in the negative, and therefore the presence of fibrin, or apparent layers of lymph, may be explained on the supposition of their source being wholly in the blood. I should state, however, that with so many conflicting opinions it is not correct to speak too dogmatically on this subject; for there are still those who follow Gendrin in his experiments, from which he believed by irritating a vessel he produced lymph, and subsequently pus; and who, indeed, think that all the inflammatory changes, with their usual results, take place from the interior of a vein, as from a serous membrane. I need scarcely again repeat the difficulty of distinguishing a fibrinous layer formed out of the blood from that of inflammatory lymph, and that it is scarcely possible to tell a pus cell from the white corpuscles always so numerous in coagula. The difficulties in determining this, daily occur: a vein, for example, is found obstructed by a fibrinous mass, adherent to the coats, or softening, and an attempt to explain its source is made with little success; but if the coats themselves are softened, infiltrated by lymph, or purulent, there can be no doubt of the existence of an actual inflammation; for the mere coagulation and subsequent changes in the fibrin may occur, as we every day see, from simple mechanical causes or retardation of the blood, or, as is so often met with during the last days of phthisis, where the blood coagulates in the iliac veins, producing an œdema of one or both legs. Acute inflammation of the vein, attended by suppuration, is sometimes seen, though not very common; the best examples of phlebitis are witnessed in chronic disease. The acute may sometimes be seen in the vein of the leg after amputation, where the vessel is filled with a coagulum, and undergoing softening, and where the coats themselves are infiltrated and easily separated from one another. The term phlebitis was formerly used in the sense that pyæmia is now: a subject which I shall afterwards refer to. The most marked cases of phlebitis are, I say, the chronic, in which the veins are found obstructed by fibrin, and this firmly united to the coats, so that they in time become obliterated, or changed into fibrous cords. Some of the best examples are seen in the pelvic veins in connection with cellulitis, after delivery, or operations in the neighbourhood of the uterus. I have seen on more than one occason, after removal of polypus, an inflammation proceed from the womb through all the veins of the pelvis, until they became perfectly obstructed. When such are examined, instead of a hollow vessel, a solid cord is found, consisting of a fibrinous mass, in close union with the thickened venous coats. You will see on the table various specimens of diseased veins; here are several containing ante-mortem clots, and others having patches on their interior which have been thought to show inflammation.[1] In connection with the disease of the ear and the temporal bone, the *lateral sinus* may become inflamed, and undergo suppuration, as you see in this specimen;[2] and sometimes this may extend down the *jugular vein*, whose coats may become infiltrated with purulent matter, which is best shown in this drawing.[3] Independently of disease of the bone, the cranial sinuses may be found filled with ante-mortem coagula, as I have now and then seen;

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[1] 352^{55}.

[1] 1521^{22}, ^{30}, 1522^{40}, &c. [2] 1521. [3] 45^{3}.

where this occurred after a burn, it was probably an extension of mischief from the exterior. In this specimen[1] you see the longitudinal sinus filled with coagulated blood. It is very remarkable that the *vena cava* sometimes becomes obliterated, as I have now several times seen; this is due to disease in its neighbourhood, in which it becomes involved, and at last contracted or quite closed. In this example[2] of abscess, or hydatid of the liver, which had become cured, the vena cava is quite obliterated and converted into a cord. In this case, as in others of a like kind, the superficial veins, as epigastric and mammary, were immensely distended, in order to carry on the circulation; drawings of which you will see in our collection. Inflammation of the *hepatic* and *portal veins* I shall speak of when I come to Liver. *Inflammation of uterine veins* I shall also allude to at a future period. *Inflammation of the umbilical vein* sometimes occurs in the infant, attended by fatal consequences. Suppuration may extend into interior of the body, producing abscess in the liver, or peritonitis.

ADVENTITIOUS PRODUCTS.—*Tubercle* is almost unknown in the veins.

Cancer does not occur primarily, but the veins may be involved in the disease. Thus, in those large masses of cancer affecting the lumbar glands, so often found in the abdomen, the coats of the vena cava may become implicated, and sometimes small sprouting fungous growths may be seen springing from the interior.[3]

PHLEBOLITHES.—These are small earthy concretions found in the veins or their coats, and generally obstructing them. They appear to result from a deposition of lymph or fibrin in the vessel, and a subsequent calcareous degeneration. They are met with mostly in the lungs, spleen, and veins of pelvic viscera, as bladder, uterus, &c.; you may see good examples in these specimens;[4] the concretion is merely calcareous, and does not consist of true ossific structure. Besides these distinct deposits, the veins throughout a large part of their course may be affected by ossific changes, but these are not of the same character as in the arteries. In the latter, the subserous coat undergoes this calcareous alteration; but in the veins, it is more on the exterior that the deposit is found, so that in the case of the arteries, supposing the iliacs and femoral were affected, they would retain more or less of their rounded shape, the coats themselves having undergone the mineral change; but if the corresponding veins were affected, the bony matter would seem to have been formed in the cellular coat, and in a very irregular manner, so that the original shape of the vessel would be lost, and if a section of the mass be made, it would be seen to be triangular, with the vessel, unless obliterated, running along one side. I have seen in the vessels above named large masses of earthy concretion on their surface, and if these be carefully examined, you will find some trace of true bone texture in them. I before said that in the so-called bony changes in bloodvessels, the calcareous matter might be called almost amorphous; but in some of this earthy matter on the exterior of the veins you will sometimes see, on microscopic examination, a number of black spots at uniform distances, with lines from them, indicating a disposition to form lacunæ.

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[1] 1520^{73}.
[2] 1521^{65}.
[3] 1522^{25}.
[4] $1528^{45, 80}$.

VARICOSE VEINS.—A condition of veins very common in the lower extremities, known by their enlargement and serpentine course. The vessels, when examined, are found to be very much thickened in their coats, and approach thus in appearance to arteries,[1] or sometimes dilated into large spaces. The cause of this affection is not positively known. It appears very certain that pressure on the trunk of a vein will produce it, and therefore various surmises have been made as to the cause of the pressure; thus, pregnancy is constantly spoken of; but then it must be remembered that the disease is more common in men; also, constipation is mentioned, but of this there is no proof. Further investigations are certainly required to determine with accuracy its cause; especially, I think, careful dissection of the saphenous opening and the neighbouring glands.

Varicocele is the term generally now applied to varicose condition of the veins of the testes.[2] The explanation of its more frequent occurrence on the left side, is the greater dependency of the testis, and the emptying of the left spermatic vein into the renal vein. Not long ago I met with a case where the arteries were in the same condition, twisted together like a mass of worms, distended and bony.

HÆMORRHOIDS.—Formerly these were considered to be varicose veins of the rectum, but this is rarely the case; enlarged veins may sometimes be found in external piles; but in the internal, they may consist of new fibro-cellular growths, highly vascular, and corresponding mostly to the folds of mucous membrane seen within the

[1] 1527^{35}.

[2] 1533, &c.

bowel. Or very often they consist of true cavernous structure, being composed of cells filled with blood and communicating freely with the hæmorrhoidal veins, their interior being continuous with the lining membrane of the vessels, and probably formed in the first place from the veins.

Choroid plexus, I shall mention in my next lecture, under Brain.

LYMPHATIC VESSELS.

I will not take your time in saying anything on a subject which is almost entirely surgical; for *inflammation* of the lymphatic or absorbent vessels is best seen in the living subject, as after death the redness subsides, and anatomy throws little light on the early stages of the affection. When filled with pus the vessels may be recognized by their knotted or varicose appearance, as they may be sometimes seen in the broad ligament passing up to their respective glands in cases of puerperal fever.

Under the head *Lacteals*, the most important affection is obstruction. This is not at all uncommon in tubercular disease of the mesenteric glands; many specimens of which you will see here. These vessels, of very irregular shape and distended, are seen coursing over the intestine and passing along the mesentery to the glands. In some cases, where their contents are hard, it is probable that some tuberculous matter has penetrated them. This appeared to be the case in this preparation,[1] but better seen in the drawing. The lacteals may constantly be found filled with chyle, without any obstruction being present, if the person die or be killed during the process of digestion. Sometimes, owing to obstruction of a duct, the chyle will collect and form a cyst, and thus small milk-white cysts may sometimes be found on the mesentery.[2] In one very remarkable instance, which I saw here some years ago, such a cyst had burst, and the abdomen contained several pints of chyle resembling milk.

THORACIC DUCT.—This is liable to obstruction at either end: if at its lower part it receives no chyle, and if at its upper part it becomes distended; but, as no great nutriment can enter the blood in either case, marasmus ensues. In the examples of tuberculous mesenteric disease which I have just mentioned, this inanition occurred; but one of the simplest and most severe cases was the last which occurred here in a patient of my own, of which this is the specimen. Owing to some induration of glands and surrounding cellular tissue in left side of neck, the termination of the duct had become obstructed; the consequence was a dilatation of the duct, as you see here, and the most wretched emaciation of the patient that it was possible to witness. Another old specimen is this.[1]

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[1] 1553, 1540^{50}, and drawing 49^{5}.

[2] 1554^{36}.

LYMPHATIC GLANDS.

Inflammation, or *lymphadenitis*, with all its consequent results, I shall not enter upon.

Hypertrophy.—This is not an uncommon condition of the glands, but it is very often difficult to say in the living subject, and even by observation upon the gland itself, whether the enlargement is due to simple hypertrophy or to some adventitious products. For example, enlarged glands in the neck may often be met with, which subside under proper treatment; and such glands, when examined, are found translucent, apparently healthy, containing no new material, and must, therefore, be called simply hypertrophied. In many of these cases, however, although no distinct cell or fibrous formation can be seen, yet there may be a quantity of translucent amorphous matter present, of a lardaceous character, which is scarcely recognizable. Such enlarged glands may be seen in this[2] and other specimens.

Lardaceous and Fibroid.—I say it is often difficult to say whether a gland is simply hypertrophied, or whether the enlargement may not be due to infiltration of this translucent, lardaceous, or waxy substance. That this is one cause of enlargement is tolerably certain, not only from the fact of this material being seen, but from glandular enlargement being associated with lardaceous disease elsewhere. Thus, in a case where there existed the largest liver I ever saw, the lymphatic glands were of immense size, and, when cut through, showed no adventitious tissue to the naked eye, but merely this translucent material. I believe that they were also hypertrophied—that is, that the true glandular structure had actually increased in quantity. This enlargement has also been observed in connection with a disease of the spleen, the two conditions together being alone able to lead to a fatal termination.[1] In many of these cases, there is also a fibroid tissue mixed with the amorphous substance, and in some instances even predominating; and thus is constituted a particular form of disease, of which I may again hereafter speak.

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[1] 1528^{40}.

[2] 1558^{50}.

TUBERCULOUS DISEASE OF GLANDS.—I shall use this term as almost synonymous with strumous or scrofulous, for so is it constantly employed by various authors. The terms strumous or scrofulous, however, are often used as merely significant of a peculiar morbid diathesis or disposition of the patient, whereas tuberculous generally denotes the actual development of disease of a peculiar kind. The ordinary appearance of a tuberculous gland you well know, consisting generally of a yellow, soft, cheesy material; sometimes, when broken up, it is seen to be composed of a distinct granular or tuberculous matter; but more generally this is not the case, and the yellow amorphous matter we see is only a degeneration of a previous material which is poured out into the gland; thus, on examination, you will see not only the soft, yellow, amorphous matter, but a grey substance, consisting of a cell formation. This degenerates or suppurates, producing the well-known curdy pus found in these glandular tumors. Another mode of cure is by drying up or cretification, nothing being left but a little chalky matter, which is the mineral part of the morbid product; and thus you may frequently find, in the adult subject, chalky masses in the bronchial, mesenteric, and other glands, the remnant, probably, of tuberculous enlargements in childhood.

CANCER.—This is one of the most common of diseases, both as primary and secondary. It has been thought by some that cancer of the lymphatic glands was always secondary, and no doubt this is often the case, for scarcely can any part of the body be affected without the neighbouring glands becoming involved. Notwithstanding this, you may be sure that primary cancer of the lymphatic glands does constantly occur. This is seen very frequently in the cervical, and also not uncommonly in the mediastinal and bronchial; indeed, I believe a large number of cases of cancer of the lung commence in the bronchial glands. In the lumbar glands, too, primary cancer may occur, though it is often secondary in this part.

The form of cancer partakes more or less of the nature of the growth from which the gland has been affected, but the more favorite form is the soft, or encephaloid. The glands are soft, brain-like, highly vascular, and emit a milky juice when squeezed. When near a scirrhous or hard cancer, as in the stomach, the neighbouring lymphatic glands are also generally hard and scirrhous.

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[1] *Guy's Hosp. Reports*, series iii. vol. ii. p. 117.

Melanosis may affect the glands, and, as elsewhere, be a distinct form of disease, consisting of colored cells, or cancer mixed with pigment.

Particular glands may be affected in a special way, and thus the *mesenteric* are peculiarly affected in *typhoid* fever. In this disease, associated with a peculiar deposit in Peyer's glands, the neighbouring mesenteric glands are also affected; these are very much enlarged, and, when cut open, found red and soft. The microscope shows the material to consist of a cell formation, and this is considered, together with that in the intestine, to be peculiar to the disease, and has been called the typhous deposit.

Bronchial Glands.—It has been stated that the bronchial glands are affected in a similar manner to the mesenteric in *fever*, but of this I cannot speak with certainty. I have repeatedly examined them, and found them slightly enlarged and softened, but not sufficient to attract attention; and this has been associated with an inflamed condition of the lung, which has also been looked upon as peculiar to the disease. Of the peculiarity of the affection I am doubtful, for I think the softened inflamed gland is merely secondary to a similar condition of lung; for in many cases of ordinary pneumonia I have seen such enlargement of glands, and I think they are always disposed to be affected at the same time with the lungs. In cases of double pneumonia, I have seen them excessively enlarged and softened; much larger than in any case of fever.[1]

The bronchial glands are also occasionally affected by *pigmental degeneration,* but seldom unless the lung is also affected. In cases of spurious melanosis of the lung, or miner's lung, where the tissue is indurated and blackened, the bronchial glands partake of the same change; they are somewhat enlarged, and when cut through, are found to be quite black, and when squeezed, emit a black juice resembling indian ink. I shall again refer to this subject when I come to Lung.

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[1] The question of a specific affection of the glands in connection with specific diseases has long been asked with respect to syphilis, and many have held both opinions—that in one case they may be specifically affected, and in another merely affected as by ordinary inflammation.

DISEASES OF THE NERVOUS SYSTEM.

BRAIN.

DURA MATER.

- **Inflammation.**
- **Deficient Development.**
- **Hypertrophy.**
- **Atrophy.**
- **Adhesion.**
- **Separation.**
- **Adventitious Growths . . . . .**
  - Bone.
  - Cancer.
  - Fibrous tumors.

ARACHNOID.

- **Inflammation.**
- **Thickening and Opacities.**
- **Effusion of Blood, and Results.**
- **Adventitious Products.**
- **Malformation . . .** Encephalocele.

PIA MATER.

- **Congestion.**
- **Hæmorrhage and Air.**
- **Œdema.**
- **Inflammation . . .**
  - Simple.
  - Tubercular (hydrocephalus).

VENTRICLES.

- **Inflammation . . .**
  - Acute, as in acute hydrocephalus.
  - Chronic. . . . .
    - Chronic hydrocephalus.
    - Granular condition.
- **Choroid Plexus .** Cystic; calcareous deposit.
- **Hydatids.**

CEREBRUM.

- **Malformation.**
- **Hypertrophy.**
- **Atrophy** .... General, local; corpora amylacea.
- **Injury.**
- **Anemia.**
- **Congestion.**
- **Hæmorrhage.** ... (Sanguineous apoplexy.)
  - Meningeal.
  - Capillary.
  - Into substance.
- (**Serous Apoplexy.**)
- **Inflammation** ... (Encephalitis or cerebritis.)
  - Congestion.
  - Exudation.
  - Softening.
  - Cysts.
  - Suppuration and abscess.
  - Do. metastatic or pyæmic.
- **Softening** ......
  - White.
  - Red.
  - Yellow.
- **Induration.**
- **Adventitious Growths** .....
  - Fibro-plastic and inflammatory tumors.
  - Cancer and melanosis.
  - Cholesteatoma.
  - Cysts.
  - Entozoa.
  - Tubercle.
- **Pineal and Pituitary Bodies.**

SPINE.

DURA MATER.

- **Inflammation** ...
  - Acute.
  - Chronic.
- **Adventitious Growths** .....
  - Cancer.
  - Fibrous tumors, &c.

ARACHNOID.

- **Malformation** ... Spina bifida.
- **Inflammation.**
- **Adventitious Growths** .....
  - Fibrous growths.
  - Bony plates.

see the falx deficient at its anterior part, and the two hemispheres morbidly adherent. This, probably, was due to some inflammatory action at the time I allude to.

Hypertrophy.—In cases where the bones are thickened, as in the specimens I showed you in the first lecture, the dura mater is often much affected in the same way. This thickening has especially been found in cases of epilepsy, and in some cases of chronic mania; also, wherever the bone has been the subject of ostitis.

Atrophy.—The dura mater may be often found thinned in parts, especially along the mesian line and near the Pacchonian bodies.

Adhesions.—In children and old people the dura mater is naturally adherent to the skull. In young infants you have often no doubt found great difficulty in separating the two, and in old people you have been obliged to use considerable force to remove the calvaria along the median line and over frontal bone; and even then the membrane has been most likely torn, and portions remained adherent to the interior of the skull. You should expect to find these adhesions in the young and old, but if in the adult they are unnatural, and show disease. Thus you may meet with them in all cases where the bones are thickened, as in the instances before mentioned, but especially in those cases where a distinct ostitis has resulted from a blow; in such the membrane may be adherent; and in exceptional instances, where lymph has been formed on the inner side, the dura mater may be found also closely connected with the brain.

Separation of dura mater from cranium usually arises from effusion of blood, owing to laceration of middle meningeal artery in cases of fracture of the skull. Blood is poured out, between the two forming a tumor,[1] which presses on the brain, produces compression of this organ, and which is often relieved by the interference of the surgeon.

Adventitious Growths.—Among the most frequent changes in the dura mater is a production of *bone*. This may proceed until the whole structure is changed into a bony case, and appears like one calvaria within another. In this dura mater[2] you see large patches of bone in different places, whereby nearly the whole of it is ossified. In lesser degrees it is very commonly met with, and especially in the falx major, which is its favorite seat. In this specimen[3] you see large pieces and plates of bone on each side of the

[1] 1606^{30}, &c.

[2] 1594.

[3] 1599^{22}.

falx; and in one case the other day, you remember we found a piece like a tooth. This we carefully examined by the microscope, and found, as in all other similar specimens, that the structure was true bone, the lacunæ and canaliculi being admirably displayed. Several such specimens are put up and preserved in our microscopic drawers. You may recollect that in my last lecture, I told you that all the so-called ossifications of the heart and bloodvessels consisted merely of very simple earthy concretions, and should rather be called cretifications; whereas now you may remember that all the ossifications of the membranes of the brain and spinal cord consist of true bone. *Cancer of dura mater* is a very common affection, and is, I believe, generally secondary to cancer that has commenced elsewhere, as in the lungs or breast. In showing you specimens of cancer of the skull, I stated that in many instances, it commenced in the dura mater, and then penetrated the bone. Its existence may not be suspected until an attempt is made to strip the dura mater from the skull, when the cancerous deposit is opened; it is then seen to form a round soft layer on the membrane, and on the corresponding surface of the skull the bone is seen eaten away in its internal table, and is occupied by the same cancerous material. I showed you a specimen where one of these growths was so large that it penetrated the cranium, formed a tumor externally; and here is a piece of dura mater[1] with these soft cancerous deposits on the exterior. Sometimes these tumors project inwardly towards the brain, but their favorite seat is on the external surface of the membrane, and implicating the bone; and in some exceptional cases a question may arise whether the latter was not that first involved. The structure of these cancers may vary as elsewhere, generally consisting of a cell growth, with a delicate matrix in which it is held; more rarely they are hard, and might be called scirrhous, containing much fibrous tissue. The growths on the interior of the dura mater are mostly of a *fibrous kind*, and spring up primarily in this texture. A very favorite seat for such is the falx major, where small ones may be found; but at the base of the skull large tumors the size of an egg may be met with.[2] These, when examined microscopically, are found to be composed of nucleated fibres; they were formerly called fungous tumors of dura mater, and were considered by some malignant; the method by which this character was ascertained, depended not only on the structure of the tumor, but whether it coexisted with cancer elsewhere; a very important feature in the evidence, but not altogether satisfactory, since in a case which happened here only a short time ago, a fibrous tumor was found growing from the falx, and associated with cancerous growths from other parts of the dura mater, secondary to carcinoma mammæ; just in the same way as fibrous tumors of the uterus may coexist with cancer elsewhere; and were, in consequence, formerly called scirrhous. Occasionally, growths from the dura mater consist of *epithelioma*, or epithelial cancer, being composed of the imbricated cells or capsules by which this form of tumor is characterized; they, however, sometimes arise on the visceral arachnoid; and, therefore, may be mentioned in connection with that membrane; and this reminds me, that although these growths of which I have spoken are said to spring from the dura mater, many probably arise from the arachnoid lining it, or from the tissue immediately beneath. As, however, they are principally connected with the dura mater, they are better described with it, while tumors on the surface of the brain may more correctly be associated with the arachnoid.

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[1] 1601^{5}.

[2] 1602^{32}, 1603^{50}.

ARACHNOID.

ACUTE INFLAMMATION, OR ARACHNITIS.—The serous membrane which lines the dura mater participates in the diseases of that structure; and, necessarily, involves the other layer of arachnoid which covers the brain. The latter also participates in a slight degree with the idiopathic inflammations of the meninges where the pia mater is the texture especially involved. For you must remember that in ordinary inflammation the serous membrane is not involved, and therefore the term arachnitis misleads; I find students who have no practical information on the subject, suppose that, as in pericarditis, pleuritis, &c., the inflammatory products are poured out between the serous surfaces; that is, between the visceral serous membrane and that forming the enveloping sac; so in the case of the membranes of the brain, or in arachnitis as it is called, the inflammatory products are found in the interserous space. This is, however, wrong; in idiopathic inflammation, the exudation is from the pia mater beneath the visceral arachnoid, although there is some slight secretion from the other side; and thus I prefer using the more general expression, meningitis, in this form of disease; in true arachnitis, where the exudation is between the serous surfaces, as in inflammations of analogous structures, I believe the disease invariably originates from without, that is, in the dura mater and skull. I have never seen extensive exudation in this interarachnoid space without an injury to the head, and thus I speak pretty confidently on the point; though occasionally, where from syphilis there has been a necrosis of the bones and disease of dura mater, such as in the case I just now showed you, the serous surfaces may be found slightly adherent by lymph. I have never, I say, known such an affection as this simple arachnitis spring up as a spontaneous disease, and therefore, when met with, you should always look for some mischief without. When arising in this way, the interarachnoid effusion is often purulent, and so copious that it may pour out when the dura mater is removed.[1] This purulent effusion may extend to the base, and is principally on the side of the fracture or injury, and is often prevented extending to the other side by the falx, or, if it reaches there, is less in amount. The inner surface of the dura mater is also covered with lymph and pus. With this effusion there may be also an exudation of lymph beneath the visceral arachnoid, as in idiopathic inflammation, and in the latter affection there may be a slight trace of exudation on the free surface; but whenever a simple acute arachnitis is found, you may look for a cause externally, in dura mater and skull.

CHRONIC INFLAMMATION, OR THICKENINGS AND OPACITIES.—As I just now mentioned, occasionally in disease of the dura mater you may find one or more parts adherent to the brain by old disease; the two serous surfaces having, in fact, united; but this is not common. The chronic inflammations are known more particularly by the increased thickness and whiteness of the membrane, especially the visceral arachnoid. As this crosses the convolutions, and especially at the base of the brain, it is seen to be a thick white membrane, instead of being transparent, and sometimes white patches or specks are seen in it. Such thickenings are found in children who have suffered long with head disease; in adults who have been affected for many years with cephalalgia; in epileptics, and in some long-confirmed maniacs, where the brain is wasted. Also, I believe you may find such a condition very frequently in those who have suffered from delirium tremens; and, if this be a true observation, I believe the cause would be found in the use of alcohol. In old people, too, there is always a tendency to thickening of this membrane.[1]

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[1] 73, drawing.

Effusion of Blood.—Blood may be met with in the interarachnoid space, and may have proceeded either from the vessels of dura mater without or pia mater within. If it originates from without, it arises from injury; although this is not very common, since rupture of meningeal arteries is attended generally by a flow of blood external to the dura mater, between that and the bone. On one or two occasions, however, where, after a blow on the head, blood has been found covering the arachnoid, and no injury to the brain could be discovered, it was considered that the source must have been some of the vessels in the dura mater. If the blood originates in the pia mater, it may have arisen spontaneously, or from an injury. Thus, in fractures of the skull, if the brain have been at all bruised, some blood will be found on its surface. Originating from disease, and thus arising spontaneously, it is not very common. I have seen it in a child, who had died of convulsions in hooping-cough, where it would be called *meningeal apoplexy*; in all the other cases in which I have witnessed it (and they have not been many), the patient has had Bright's disease. In some of these it was quite unexpected, and had evidently happened only a short time before death; on removing the dura mater, a thin layer of recent black coagulum was found partly covering the hemisphere on one side; its source must have been the pia mater, though it was impossible to find the ruptured vessel. When a slight effusion arises from injury, and recovery takes place, a very remarkable change often occurs in the blood, whereby a *cyst* is formed. When such cysts or sacs have been found in the cavity of the arachnoid, many surmises have been made with respect to their character and origin; but lately Mr. Prescott Hewitt has traced their commencement in many cases to an effusion of blood, and shown how this, in process of time, assumes the form and structure of a serous cyst. If, from injury, blood be effused between the arachnoid surfaces, it forms a thin layer over one or the other hemisphere, and coagulates; soon the fluid part is absorbed, and the fibrinous layer, with the coloring matter, undergoes changes. The color alters to a chocolate-brown color, the corpuscles are broken up, and the hæmatine crystallizes. In a case I examined not long ago, where death occurred three weeks after the injury, a thin brown layer covered the hemispheres and inside of dura mater in this manner. The crystals of which I speak are named *hæmatoidin*, and are formed from the hæmatine; they are of a deep ruby red color, and in shape oblique rhombic prisms, sometimes a little more irregular, and if seen for the first time you might perhaps mistake them for uric acid. It might be important to know at what time such crystallization takes place, so as to ascertain the duration of the effusion, but of this I cannot speak more positively than that they may be made in a short time artificially, but in the human body I never saw them within three weeks after a sanguineous effusion; in recently poured-out blood, the hæmatine is in irregular granular masses. In this specimen[1] of dura mater, you will see a thin brownish layer of altered blood, which was formed in a month after the injury. After a longer period, as several years, a film of blood of this kind will form a distinct membrane, which becomes, indeed, a serous structure, and this has sometimes been looked upon as an organized layer of inflammatory exudation from the serous surface; and sometimes, where two such layers have existed, a distinct sac has been formed, and thus a separate loose cyst has been found beneath the dura mater. Such a cyst I lately had sent me, and proved, I think, clearly the mode of formation, for in its interior were numberless crystals of the character I have described. It is unfortunately mislaid, and this one[2] is not so perfect.

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[1] 1584^{12}.

Adventitious Products.—I have already said that the growths which I have described as springing from the dura mater may in many instances arise from the arachnoid, but, as they are so intimately connected with the first-named structure, they are more advantageously placed with it; but when tumors are found in the interarachnoid space, and with scarcely any connections, they must be described with the arachnoid, and especially when they grow from the surface of the brain.

The *fibrous tumors* which are found growing from inner surface of dura mater may occasionally, though not frequently, be met with on the brain, springing from the arachnoid; and as also, sometimes, tumors from the former surface may be of the epithelial variety, so may *epithelioma* be sometimes met with on the visceral arachnoid of brain; at least, tumors are found composed of the large imbricated mother cells which characterize this disease. Wedl also mentions a *papillary* or *villous growth* which sometimes arises from the arachnoid, and I have once seen a small growth of this kind which had a number of shaggy villous processes upon it. He describes it also as vascular, and containing dilated sacculi filled with blood. Another class of tumor which appears to arise in the arachnoid is the *cholesteatoma*, a specimen of which you see in this bottle.[1] The man from whom it came was in the hospital suffering from cerebral symptoms, and left here to go to Colney Hatch Lunatic Asylum, where dying, this tumor, of about the size of an egg, was found at the base of the brain, loosely connected with the arachnoid, and was sent to me by Mr. Tyerman.[2] It was of pearly lustre, and broke to pieces when handled, just as the matter from a sebaceous tumor, with which, indeed, it is in all respects identical, for it consists of a mass of cells containing fatty matter mixed with plates of cholesterine, and hence the name. You know, in a sebaceous cyst, the suety matter consists of cells, which are neither mere scales of epithelium nor large globular bodies filled with fat, but something intermediate. These thin-walled cells are found lying one over the other, and some so attenuated as to resemble membrane or fibre. A few dark dots are seen within them, but a nucleus is doubtful. It is interesting to remark that such a form of growth, as well as epithelioma and papillary tumor, should arise on the cerebral membranes; I suppose there is something in the structure of the latter allied to the skin, which causes them to produce such a class of growth, but I do not know any closer resemblance than that of other membranes. *Hydatids*, which are occasionally found in brain, may also develop within the arachnoid. The only case which I have seen was that of a child whom I attended some years ago, at the Surrey Dispensary, and, on removing the dura mater, two or three cysticerci fell off from the surface, being loose, or only slightly connected with the arachnoid; they were of moderate size. This is an old museum preparation,[3] showing a cysticercus from the surface. *Tubercle* is rarely found on the arachnoid. In cases of very acute tubercular meningitis, sometimes the anterior lobes may be found slightly adherent to the orbits, or the same in other parts, and a little tubercular lymph may be found. Also, occasionally in arachnoid a miliary tubercle may be seen, but this is rare.

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[1] 1605^{30}.

[2] 1591^{60}.

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[1] 1577^{10}.

[2] The same gentleman has subsequently sent me another specimen, from which it would appear that this form of tumor occurs mostly in the insane.

[3] 1590^{75}.

MALFORMATION.—I have already mentioned to you how often the laminæ of the spine are deficient and the meninges protrude, forming a cyst in the back; in the same manner, from an unnatural opening in the cranium, the cerebral membranes may escape and form a sac, and sometimes with them a part of the brain itself. The brain tumor thus produced is called *encephalocele*. Sometimes, such a deficiency of bone may occur on the forehead or on top of head as you see here;[1] but, generally speaking, the opening is behind, in the occipital bone, between the fontanelle and the foramen magnum. Here, through a round opening, the cerebral contents escape. In this head,[2] where the calvaria has been removed, you can see the hole within, and the membranes passing out to form the external sac. In this other preparation,[3] you can better see how the cyst is formed: the arachnoid appears free, but the dura mater is lost on the external covering of integument. If the protrusion arise simply from a bag of membranes containing fluid, the affection is styled *hydrencephalocele meningea;* such a case you had an opportunity of lately seeing in Mary ward, and of which this is a drawing.[4] The cyst protruded from the back of the head, and was quite transparent; it spontaneously sloughed, the fluid escaped, and when the child left, the wound was healing. In many cases, the protrusion is far more serious, and contains brain structure as well as fluid, when such affection is simply styled *hydrencephalocele*. A very good example is seen in this drawing[5] of an infant, where you see hanging from the posterior part a tumor almost, if not quite, as large as the head itself. Dr. Lever, to whom the case belonged, requested me to make a post-mortem examination, and I found the following peculiarities. In the middle of the occipital bone was a round opening, and through this it appeared as if half the brain had been squeezed; and thus, within the true cranium, which was very small, from the frontal bone being pressed down, was the anterior and part of middle lobes of the brain, and in the sac behind, the remaining portion. The ventricles, in like manner, were divided between the two, the sac containing their hinder part, with the choroid plexuses; the posterior lobes were adherent to membranes which formed the sac, and corresponded to parts of the tumor on which pressure had been made from supporting the head, and which were sloughing; the corresponding portions of brain being also softened. This shows that such a condition of head is incompatible with life,

[1] 1563. [2] 1563^{55}. [3] 1563^{60}. [4] Drawing 501^{31}. [5] Drawing 501^{30}.

if it only be from the want of a protecting case. The cerebellum was within the cranium, as usual. When a congenital tumor is found high up in the neck,[1] it is sometimes difficult to say whether it be a brain tumor or arise from spina bifida. In such a case, where a cyst had existed for many years, Mr. Solly describes that its neck or peduncle became impervious—that is, underwent a spontaneous cure—and then the sac was removed.

PIA MATER AND SUBARACHNOID SPACE.

Congestion.—I must warn the inexperienced against mistaking a mere fulness of the bloodvessels, arising from accidental causes, for a morbid congestion; and even against regarding the latter, which is often only of trivial importance, for an active state. Those who are not much acquainted with post-mortem appearances, are too apt to regard a brain full of blood as a pathological condition, and this is a state very likely to be present; for the case requiring examination, is one perhaps ordered by the coroner, and several days may have elapsed since death, and perhaps the head only may have been opened; and if death has been sudden, which is very likely to have been the case, there is even another reason for a fulness of the bloodvessels. Thus there is more blood in the body of a person struck down in comparative health, and if death be sudden, this may stagnate in the organs, and then, from the body having been supine for some days, the brain becomes gorged; and, further, which is very important to remember, if the head be examined first, the vessels are necessarily more full than if the body be previously opened, for then, the veins being cut and jugulars emptied, the blood flows out from the cerebral sinuses and veins of the surface. You may observe the difference constantly in the post-mortem room, according as the body or head is first examined. If the head even be opened after the body, and the person only dead a short time, and yet the vessels of dura mater, of pia mater, and the brain itself be very full of blood, it is generally then unimportant, and points merely to the cause of death by asphyxia; and thus in all pulmonary obstructions, whether primary or secondary, the brain is found congested like all the other organs. Cases in which a real congestion of the brain occurs, shown by the number and size of the puncta vasculosa, are exceptional, although so often spoken of; when, however, seen, the brain is very full of blood, which pours from the small vessels when cut, and the color of the cerebral substance itself is much altered, the medullary being of a pink color, and the cortical of a much darker hue than natural. In many cases of this kind, the blood which appears bursting forth is due not to congestion, but from a diseased or purpuric condition of the blood itself, and which condition may pass into one called capillary apoplexy, which I shall presently mention.

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[1] Drawing.

HÆMORRHAGE BENEATH THE ARACHNOID is of the same kind as that between the arachnoid membranes already mentioned, when the latter arises from the surface of the brain. For in all such cases the blood has arisen from the pia mater, and has then burst through the visceral arachnoid. It may, however, run beneath it when the brain is injured, or when meningeal apoplexy is a spontaneous disease. It is not uncommon, too, to find blood beneath the arachnoid, at the base of the brain, in severe forms of apoplexy, where, having arisen in a central part of the brain, it bursts into the lateral ventricles, and then passes by the third to the fourth ventricle, and from thence into the subarachnoid space of the medulla oblongata, pons Varolii, and adjacent parts. Occasionally, too, the remains of old sanguineous apoplexies may be found on the convolutions, especially near the fissure of Sylvius, whence often the blood has issued.

AIR IN THE SUBARACHNOID SPACE.—I speak of this because it is often met with, and students are constantly asking questions about it; and, moreover, I have seen it mentioned in a medical journal as a pathological condition. It arises simply from air rushing beneath the arachnoid when the calvaria is removed. You may not meet with it yourselves so often as you see it here, where the head is more speedily opened than we are able to accomplish in private. You will observe, that in sawing around the head, the visceral arachnoid is slightly wounded, and then, when the lever is inserted under the bone, and the calvaria is suddenly pulled off, a vacuum is produced, and air rushes through the opening into the space beneath, and traverses the course of the bloodvessels, and thus the bubbles of air which have attracted the notice of some of you.

ŒDEMA AND SUBARACHNOID EFFUSION.—Nothing is more common than to see the subarachnoid fluid increased in quantity, and, being the first thing observed on opening the skull, often attracts much attention, and much more than it deserves; for, as a rule, it denotes merely a shrunken or wasted brain accompanying a similar state of organs in other parts of the body, and thus is a common condition met with on our post-mortem table. In persons long ill with chronic wasting diseases, the brain shrinks, the convolutions lose their plumpness and separate, and the space thus unoccupied becomes replaced by fluid. This you see bagging down in various places when the dura mater is removed, and the brain itself is generally pale. In the large majority of cases where you find this subarachnoid effusion, it arises from the cause named, and not from any active inflammatory condition, for then the exudation would be plastic or purulent, accompanied by vascularity and other characteristics. Neither does the œdema accompany a dropsy of other parts, as you might imagine, for there is, indeed, no room for the effusion; to a certain extent only where dropsy occurs elsewhere, there may be an increased wateriness of the brain and its membranes. It is important to recognize this as a mere passive condition, and denoting atrophy rather than an inflammatory process, for you may often wish to know, by post-mortem examination, whether certain symptoms denote a diseased condition of the brain or not. Thus in a case of advanced tuberculosis or phthisis, the patient has towards its termination, delirium or other brain symptoms, and you may suspect some disease in the brain similar to that in other parts; but upon examination you find the brain shrunken with fluid on the surface, denoting mere atrophy, whereas any active tubercular condition would be accompanied by effusion in the ventricles, and the brain would be flattened against the skull, the convolutions plumper than natural, and there might be no fluid at all apparent. I dwell on this, because I know a novice is apt to pay great attention to this œdematous state of membrane. Some of you may be thinking that if such an effusion was in great quantity it would amount to a disease, and constitute *external hydrocephalus*. I may, therefore, at once say that I am personally unacquainted with any such disease. I believe there are some who consider such an affection does exist, but I have myself very strong doubts about it. In the case of the lad Cardinal, whose immense skull I the other day showed you, it has been thought by some that the effusion was external to the brain, because when the cranium was opened, several pints of fluid poured out, and the brain was found at the base; but on reading the account, I think it is very clear that the fluid had during his lifetime been contained in the immensely distended ventricles, and that the brain was unrolled and occupied the circumference of the skull, but that just before his death the fluid burst through the corpus callosum, and thus the peculiar condition met with.

MENINGITIS, OR INFLAMMATION OF PIA MATER.—It is in connection with the pia mater and the subarachnoid space that the exudatory products take place in inflammation of the membranes of the brain, and thus it is under this head that some of the most important acute diseases of the brain are to be noticed. Simple arachnitis, in which the effusion occurs from the serous surfaces, is an affection, as I told you, intimately connected with disease of dura mater, and arises from some external cause; whilst the effusion beneath the arachnoid, and immediately in connection with the cerebral substance, has its cause within, and constitutes the idiopathic inflammation of the membrane; with this, however, there is constantly a very slight exudation on the free serous surface; but this is insignificant compared with the purulent arachnitis in the same part, arising from injury, of which I before spoke. In ordinary idiopathic meningitis, the effusion, be it lymph or pus, is poured out from pia mater; a structure, as you know, consisting of a congeries of vessels held together by areolar tissue, running between the convolutions and beneath the visceral arachnoid membrane; when this is affected there can be no doubt that the adjacent brain structure is also involved as well as the ventricles, and probably other parts; as, however, the changes are less appreciable here than in the membranes, we are accustomed to speak of the affection as meningitis, although, in all probability, in many cases the whole cerebral structures are involved.

Acute meningitis is mainly of two kinds, *simple* and *tubercular*, the latter being also known as acute hydrocephalus. It is highly important to distinguish between these two forms, the peculiarities of each not being so generally insisted on as they should be; but they are very characteristic.

SIMPLE MENINGITIS.—In this form of disease you find the surface of the brain, in the space beneath the visceral arachnoid, filled with a lymph or purulent lymph of a greenish color. This is especially seen in the sulci between the convolutions, but may exist in such great quantity, that the cineritious structure is quite hidden; and thus, directly you remove the dura mater, you are struck with seeing this inflammatory effusion completely covering both hemispheres, as if a layer of green purulent lymph had been poured over them: this appearance you see in these drawings. On placing the finger on the brain, you perceive at once that the effusion is beneath the arachnoid, and cannot be removed without cutting this membrane. On scraping the external surface, it is probable that a small quantity of exudation may be seen on the scalpel, for it is scarcely possible for such an acute inflammation to exist on one side of a membrane without the other being slightly affected. On removing the brain you will find the sides covered in the same manner, but to a less degree; and on looking at the base, there is generally but little effusion there. The ventricles are not necessarily, I think, affected; but generally the fluid in them is increased, and is somewhat turbid. On attempting to remove the pia mater from the surface of the convolutions, the cineritious structure is found to stick to it, and to tear when any force is used, showing that it has also been involved; and, indeed, it would be impossible to say in such cases what parts of the brain had not suffered, though it is only on the free surfaces that the changes are markedly perceptible. In one of the last cases of this kind which we examined, the veins of dura mater were filled with firm coagula. You must remember that no tubercles are found in this disease, neither in the brain nor any other part of the body; and, indeed, its pathology is scarcely known, though, in all probability, the disease occurs in the exanthemata; for example, as a sequence of scarlatina. It is a disease very acute, running its course in three or four days. Not many months ago, we examined a child with this form of disease, who had been only ill three days, and every other part of the body was healthy. It is possible it may originate in injury, as well as the simple arachnitis, of which I spoke; but I have no proof that this has ever been the case. I have seen two or three instances where an inflammation of the spinal cord (resulting from disease of the bone) has extended up to the brain, and produced a meningitis, in which cases the greatest abundance of lymph has been at the base.[1]

TUBERCULAR MENINGITIS, OR ACUTE HYDROCEPHALUS.—This is a form of disease quite peculiar, and one which you will find very important to recognize; for, apart from the presence of tubercles, the characters of the inflammation are such that you may know at once what is the kind of affection you are looking upon. The disease is less acute than that last mentioned, generally running a course of three or four weeks, with symptoms less urgent. On removing the dura mater, the surface of the brain is flattened, owing to the pressure which has been exerted by the ventricular fluid within forcing the hemispheres against the skull. The convolutions are thus pressed together, the sulci almost obliterated, and the brain dry and vascular. The arachnoid may have somewhat lost its lustre, and on scraping it a small quantity of exudatory lymph may be obtained on the scalpel, and beneath the arachnoid no effusion is seen, unless perhaps, on looking at the sides, a small quantity may be observed in one or two sulci; thus the surface of the brain presents no marked inflammatory products, as in the other form. On removing the brain, very distinctive appearances are seen in a quantity of greenish tenacious lymph present at the base, and covering the pons Varolii, optic commissures, infundibulum, &c. If this lymph be examined, some tubercular matter will be found in it. This exudation is also generally seen proceeding upwards in the fissure of Sylvius, so that, if the lobes be separated, a quantity of it may be found connecting them together, and in it there is also usually tuberculous matter. The latter is probably of recent formation, for the true miliary tubercles are not seen on the surface, but must be searched for in the pia mater: thus, if they abound in great number, they may be seen between the convolutions when the hemispheres are removed; but generally it is necessary to separate the pia mater before they can be seen: this is readily done by taking a portion of the circumference of the brain and stripping off the visceral arachnoid, together with the pia mater, and carefully examining the portions of the latter membrane which dip down between the convolutions, and on these especially you will perceive the tubercles. In this piece of membrane[1] you will see numbers of small white miliary bodies closely attached to these depending portions. Besides these tubercles, which are generally supposed to pre-exist before the inflammation, there is tuberculous matter mixed with the lymph, and which, it is thought by some, may be recent, and formed during the inflammatory attack, since it is intimately mixed with the exudation, and is itself of soft consistence. Probably tubercle exists before the inflammatory exudation occurs, but that during this process a still further and more rapid production of it takes place, in the same way as in the phthisical lung and other tuberculous organs. I am under the impression also that the simple miliary tubercles are not of long duration before they show signs of their presence, from the fact that in many cases of children who have died of general tuberculosis, and where there have been no cerebral symptoms, I have carefully examined the membranes, to see, if perchance, any tubercles might be present, but I have hitherto always failed to find them. And now as regards the ventricles. On slicing the brain until they are reached, you find the roof bulging out, owing to their distention with fluid, which reaches sometimes to as much as four ounces, though generally less; the fluid is itself more opaque than in health, and becomes somewhat more so on boiling, and I believe the specific gravity is increased, this having been 1010 in some cases which I have examined. The circumference of the ventricle is soft, sometimes exceedingly so, as to be quite diffluent; and this is more the case in the central parts than the sides: thus the fornix, septum lucidum, &c., are affected, and the former sometimes quite broken down, and shreds of tissue hanging into the ventricles. If the septum be not broken, the foramen of Monro between the two cavities, is much enlarged. Much controversy formerly existed as to the cause of this softening, whether it be inflammatory, or due merely to the ventricular effusion; but there is no doubt as to the former being the correct explanation, both because a mere soddening of the cerebral tissue will fail to produce a like effect, and also that the microscope reveals inflammatory products. This instrument does not actually show those large granule masses which are so characteristic of ramolissement, and which I shall presently mention; but it shows the elements of these, or the fatty granules collected along the course of the capillary vessels, and which is sufficient to contraindicate the idea of mechanical softening. If the surface of the ventricle be carefully examined, it will sometimes be found granular. This may be overlooked, unless the brain be held to the light, and then the surface appears as if it had had some fine sand sprinkled over it; this condition may continue downwards into the fourth ventricle. As I said, when speaking of simple meningitis, we are apt to regard these affections as inflammation of the membrane only; but, in all probability, the whole brain structure is more or less involved, though the evidence of its disease is less appreciable. Thus the paralysis which so often occurs in hydrocephalic children, would seem to show that some of the central parts of the brain are affected to a deeper extent than the mere surface of the ventricles, and, as regards the exterior of the brain, it is impossible that it can avoid suffering when the pia mater is affected; and this is demonstrated, I think, by the softness and adhesiveness of the cineritious structure, but which is not so marked in the tubercular as in the simple form of meningitis. Thus, in attempting to remove the membranes, the grey matter comes off with them and adheres to them, and tears up in layers, which may be thus separated from one another. To recapitulate: the distinctive characters of tubercular meningitis are, the absence of lymph on the surface of the brain (so differing from the simple form), a flattening of the hemispheres, lymph at the base, tubercles in the pia mater, and increased fluid in the ventricles, with softening of their walls. These are characters which would at once indicate the disease, even if tubercles were not present; for I can imagine, if a child were very tuberculous in other parts, such an affection as this might be set up in the brain without the actual presence or production of tubercles; and I constantly hear of such affections occurring without any of these small bodies being found. Although I think this possible, I have never myself met with such an instance in a child, therefore I feel considerable doubt as to whether a thorough examination of the pia mater was made. I may here remark too, that in no one case of this affection have I failed to find tubercles in some other part of the body, and in no case, however young, have the lungs been free.

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[1] I have lately seen two such instances of acute and apparently idiopathic meningitis of spinal cord and brain.

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[1] 1584^{20}.

Occasionally, in very rare cases in adults, the brain may be inflamed, as a complication of other diseases, in a somewhat similar way to that of the tubercular.

VENTRICLES.

Inflammation.—This, in its commonest form, I have just spoken of under Acute Hydrocephalus. The fact of these parts so suffering, has given this synonym to tubercular meningitis. The ventricles are often, no doubt, also involved in other forms of disease.

Chronic hydrocephalus has a somewhat difficult pathology, and probably more than one disease is included under this name. Common as the disease is, yet, being of long duration, the chances are few of our being able to watch a case to its termination, and to examine the parts after death. Those who now and then have an opportunity of so doing, report nothing but increased ventricular effusion, which sufficiently shows that the morbid appearances are not very great; and this has led some to suppose that the disease is in every respect analogous to a pleuritic effusion, where we suppose the membrane to be in a morbid state from the fact of the increased secretion, although there are no changes appreciable to the naked eye. It has also been thought that some local inflammatory process, whereby the veins of Galen are impeded, might be a cause for the dropsy of the ventricles. It is probable, however, that further researches may show a variety of diseases included under one name: there is the hydrocephalus with which some infants are born; then the more common variety, which comes on some weeks after birth; and there is also another, in adults or grown-up persons, of which I have now seen several, and which, probably, depend upon some chronic changes in infancy. I have seen a young man who had been affected with his head all his life, which was not larger than natural, but where the ventricles were immensely distended by fluid. I have showed you already the skull of an adult who seemed to have had a hydrocephalic affection all his life; and not long ago I examined, with Mr. Hilton, the head of a gentleman who had never had his mental faculties right since birth, and dying rather suddenly, an immense ventricular effusion was found. In this case the arachnoid appeared everywhere opaque, particularly at the base, and this seemed to close the fourth ventricle, and thus the opinion of Mr. Hilton, that this is one cause of ventricular effusion; for, as you know, there is a natural communication between the lateral third and fourth ventricles, and from latter to subarachnoid space, so, if the opening from the ventricle be closed, the fluid will naturally collect in the ventricles. The theory certainly seemed borne out in this instance. Only lately we examined a man who died of head disease, and all that was found were several ounces of fluid in the ventricles, and on their surface granules and patches of indurated lymph; all apparently the result of chronic inflammation.[1] In some cases the ventricular effusion is clearly secondary to some scrofulous disease at the base of the brain, although during life the case may be considered to be one simply of hydrocephalus. As I said before, in chronic hydrocephalus the fluid is always within the ventricles; an external hydrocephalus is spoken of, but I never saw it. The true pathology of the disease has yet to be learned.

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[1] Since writing this, I have met with two similar cases, one in a young man and another in a boy, who had been ill some time with obscure head symptoms, when all that was found was a hydrocephalic condition—large quantity of fluid in ventricles, old thickenings of arachnoid at base, surface of brain much compressed, and slight and very recent inflammation of hemispheres.

A *chronic inflammation* of the ventricles, shown by a granular condition of their surface, is sometimes met with; I do not speak of the lining membrane, for this is scarcely demonstrated to exist. I have already mentioned such a condition in the brains of acute hydrocephalus; but it may be constantly met with in the ventricles of those who have suffered from chronic disease of the brain, and thus it may be noticed accompanying organic disease in other parts, as inflammatory softening. In one case which I remember seeing some years ago, the whole of the interior was covered with large translucent granulations as large as hemp-seeds, giving the whole the appearance of the leaf of an ice-plant. In another case which occurred only lately, the adventitious matter was in patches or layers, presenting just the appearance as is sometimes seen on the liver after an organization of lymph, having somewhat of an honeycomb aspect. If this be examined by the microscope, it is found to consist of inflammatory products, nuclei, and nucleated fibres.

CHOROID PLEXUS.—In cases of chronic atrophy of the brain, and in old people, it is not uncommon to find a *cystic* formation in these bodies. The cysts may be two or three in number, and the size of peas, or larger, as you see in this specimen.[1] They were formerly called hydatids. Associated with these, or occurring separately, but in the same class of patients, are *earthy concretions;* these are rounded bodies composed of carbonate and phosphate of lime, and have no analogy to bone. Hydatids may, however, very rarely occur, for here is a preparation[2] showing two cysticerci which came from the lateral ventricles.

CEREBRUM.

MALFORMATION.—There are various kinds of malformation of the brain, some of which I have already alluded to, as its absence in the anencephalous skulls, and its protrusions through openings in the cranium in cases of encephalocele. There is also the general want of development in idiots, and various local malformations, as deficient corpus callosum, &c.

[1] 1588^{5}. [2] 1590^{14}.

HYPERTROPHY.—It is a question how far such a pathological condition as true hypertrophy may exist. We all know that in scrofulous children, the head is often inordinately large, and the brain correspondingly so; but this unusual size can scarcely, I think, be called hypertrophy. In the cases which have been styled such, symptoms have been present, and even death the result. I have never witnessed such a case, but Andral states that occasionally in a child who has had cerebral symptoms, and you expect to find hydrocephalic disease, you discover upon removing the bones that the hemispheres are flattened against the skull, and actually protrude when the pressure is removed, as is seen in ventricular effusion; but on examining the central parts of the brain, no fluid is found, but, on the contrary, the ventricles are small, and, therefore, the size is due only to an actual growth of the cerebral structure, or a morbid hypertrophy.

ATROPHY may be general or local. A *general atrophy* of the brain is not uncommon, and I have already alluded to it in speaking of subarachnoid effusion. In old age, in persons long bedridden by sickness, and in old cases of mania, the brain is found shrunken, not filling the skull, the convolutions falling asunder and pale, and the space occupied by a large quantity of subarachnoid fluid. In such brains it is not unusual to find increased ventricular fluid, and the septum lucidum very thin or perforated by holes, as you see here.[1] A *local atrophy* is very common, arising from diseased bloodvessels, inflammatory softening, &c., and will again be referred to. Where the cause is not very evident, we are obliged to be content with the term atrophy. Thus some years ago there was an old paralytic who was several months in Job's ward, and when he came to die we found the left hemisphere of the brain almost completely gone, there was a large space within the membranes holding half-a-pint of fluid like lime-water, and shreds of cellular tissue passed across it and formed its boundaries. It did not reach the ventricles until the time of death. The bloodvessels in this case were diseased, but not impervious; and, therefore, it remained doubtful whether such wasting depended on want of vascular supply, or whether, in the first instance, there had been an apoplexy, and the brain had wasted in consequence. That an obstructed vessel is sufficient for the process is constantly seen, and how soon a change occurs in the part in consequence, some of you had an opportunity of seeing in the case of a boy in whom Mr. Birkett tied the carotid artery, and who soon afterwards was seized with hemiplegia of the opposite side, and it was not for some days that the limbs recovered themselves. In some cases of congenital paralysis, where from birth one side of the body has been atrophied and useless, the opposite side of the brain has been found wasted. This has no doubt resulted from disease in fœtal life: a theory which receives some confirmation from a case I lately read, of a child who was born hemiplegic, and soon after dying, a clot of blood was found on one side of the brain. This the doctor very naturally attributed to a blow which the mother had received on the lower part of her abdomen during her pregnancy. If, then, the child had grown up, an atrophy of this part of the brain would have ensued, with a permanent paralysis of the other side of the body. In atrophied brain structure, various products are found, which I shall mention under Inflammation; but, as a result of the change, you may find a number of amorphous, translucent more or less, rounded bodies, which are probably in composition something between albumen and fatty matter; they have been called colloid, and appear to resemble the lardaceous matter found in other organs. I believe they merely show an animal substance of a very low formation, not organized, and such may be found in the kidney and other parts. Considerable interest has been taken in these lately, from the statement that if iodine be placed upon them they turn blue; they have, therefore, been considered starch, and styled *corpora amylacea*. I have long known such bodies by the microscope, but I have never yet succeeded in obtaining a good blue color by means of iodone, and even then I think that proof is wanting that they are absolutely starch. The subject is an interesting one, and is still being investigated.

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[1] 1564^{60}.

INJURY.—Injuries to the brain are of exceedingly dangerous character; but if no general inflammatory action ensue, a considerable loss of substance may occur without involving life, even to the amount of the whole of one hemisphere. An incised wound may heal, as in any other organ, and, without doubt, slight bruises to the substance are constantly recovered from. We have not frequent opportunities of seeing brains which have been simply the subject of concussion, but if so, the cineritious structure is found bruised and ecchymosed; in cases where death has occurred after a blow, this state is met with; and in all cases of fracture of the skull, in parts removed from the seat of injury, such an ecchymosed condition is found; it is therefore, without doubt, constantly occurring in concussion, and in those railway accidents where persons who, without striking their heads against any object, suffer from concussion at the time, and have similar symptoms for months afterwards; for in such the sudden stoppage of the body, travelling at great velocity, causes the brain to strike against the skull, and no doubt lacerate the substance. Judging from the recovery of such persons, and knowing what happens when the head is struck, I think a considerable amount of superficial injury may be repaired. On examining the cineritious substance, you find spots of a dark color; and, on minute examination, you discover in these, small extravasations of blood, and some granule masses, showing the softening process which has been going on. Probably no new cerebral substance is produced, but an indentation or cicatrix remains. A few months ago, a child, four years of age, had a pocket of hops fall on its head; there were no external signs of injury, and after death, in three days, none were found either in scalp or bone. The brain was found bruised all over, but more particularly at the anterior and middle lobes of the base; the cineritious matter was ecchymosed as well as the surface of the ventricles, and the fluid within was of a pink color. The most marked cases of injury are those known as *hernia* or *fungus cerebri*, as you see in this specimen,[1] where, after a fracture of the skull and injury or sloughing of the dura mater, an inflammatory exudation takes place, and this, mixed with the softened cerebral substance, protrudes from the surface; if cut off, it is found composed of brain and inflammatory products. Subsequently, granulations form on the surface, and a cicatrix is produced, uniting together the cerebral structure, membranes, and integument. Various other injuries, which may arise from fractured skull, I need not mention, as they are different in every case; but it may be as well to remember that sometimes the internal parts suffer as well as the external, and thus I have witnessed several times a laceration of the septum lucidum, and extravasation of blood into the ventricles. This you may see in this specimen,[2] and you will find several others showing injuries to the brain.

CONGESTION AND ANEMIA.—These are conditions I have already spoken of in connection with the pia mater; for whatever state this membrane may be in, in this respect, the same holds good also of

[1] 1564. [2] 1578^5.

the brain. I must warn you, therefore, against attaching too great importance to fulness of the vessels, which implies often merely a dependent position of the body, or that the person has died with some pulmonary obstruction, whereby all the organs are full of blood. I believe it to be quite the exceptional case where increased vascularity denotes any primarily altered state of the brain itself; and if so, the medullary part is of a pinkish color, and the cineritious much darker than natural. An anemic condition is one very generally seen in connection with wasting disorders.

HÆMORRHAGE.—This may be *meningeal,* as I have already said, where blood is poured out on the surface of the brain; it may also be *capillary,* where the blood is seen bursting forth from various parts of the substance: thus, if a section be made, not only are the *puncta vasculosa* or divided bloodvessels seen, but there are spots of ecchymosis where the blood has actually escaped into the tissue. In the same way, on the interior of the lateral and fourth ventricles these spots may be observed, and amount sometimes here to small extravasations into the tissue.[1] This condition of the brain denotes a diseased state of the blood or the vessels generally, and is found in purpura, and sometimes in fever. I believe it has been the immediate cause of death in almost all the fatal cases of purpura which I have seen. I have also observed a slight paralysis come on in a case of fever, shortly before death, and where this state of capillary apoplexy existed; and I believe it also accounts for the convulsive attacks occasionally observed in typhus. The commonest form of sanguineous apoplexy is where blood is effused in some quantity into the *substance;* and I may here remark upon the obscurity attending the term *apoplexy;* it was originally employed to denote a disease where the patient was struck down senseless, whether this were due to an effusion of blood or other cause, and in this sense it is still used by some writers; but, on the other hand, as the cause of such sudden attack is so often due to an effusion of blood, the term apoplexy is used by many as synonymous with such effusion, and even carried to a similar state in other organs. Without arguing upon the absurdity of this, we must use the terms as they are generally employed, and as regards the brain, to avoid confusion, adopt the term *sanguineous apoplexy.* It arises from the rupture of a bloodvessel, owing to disease in its coats, though this is not always found; but if not, the arteries throughout the cerebrum are much diseased,[1] as well as those in other parts of the body. As disease of the vessels is one of the most marked of senile changes, so, necessarily, the tendency to apoplexy increases with age, and the older the person, the more liable is he to an attack. Also, inasmuch as degeneration of the arteries is so often associated with Bright's disease, it is very common to find apoplexy and this affection of the kidney occurring together, and this, perhaps, is the reason why formerly another reason was given for the effusions into the brain; I allude to hypertrophy of the left ventricle. This, I have already told you, is very often associated with the granular kidney and disease of the arteries; and therefore, since apoplexy often comes on as a finale to the whole, it can be seen how formerly, where the hypertrophied heart was the most remarkable alteration found in the organs of the body, the effusion of blood was thought to be due to its increased action. The parts where blood is effused in the brain are necessarily the most vascular, and thus it is rare to find it in the medullary structure; but it is in the cineritious, or more especially in the central parts, as the corpus striatum or optic thalamus, or between these, where the cerebral arteries are numerous and enter the brain. In by far the majority of cases, the blood is effused in the parts mentioned, and more especially in the corpus striatum; and thus, in those most frequent forms where, after an apoplectic attack, a hemiplegic paralysis ensues, and the patient should live for some months or a longer period, you may expect a clot, or remains of one, in this part rather than any other. In such a case as this, the effusion is limited, is confined to the spot where it occurs, and recovery takes place according as favorable changes go on in the blood. In the rapidly fatal cases, the seat of the hæmorrhage is generally the same, only, instead of the rupture in the vessel being small and soon closing, a larger quantity of blood is poured out, which infiltrates the tissues all around, even into the medullary substance, and, passing inwards, breaks into the ventricle, when running down through the third into the fourth ventricle, and so into the subarachnoid space about the medulla oblongata and these very vital parts, death rapidly ensues. In some cases, when the effusion occurs immediately beneath the parts of which I speak, the blood may escape on to the surface, and there we may find it at various periods afterwards, having undergone its changes. Also, sometimes it appears originally to break out on the surface, especially in the fissure of

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[1] Drawing 71^{78}.

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[1] 1585^{25}, and drawing 71^{45}.

Sylvius, which, as you know, is filled with bloodvessels. In more rare cases, several small apoplectic clots, or remains of them, may be found in the brain; occasionally, also, in the pons Varolii, and sometimes in the cerebellum, but the latter scarcely once, I think, in fifty cases. After effusion of blood into the substance of the brain, various changes ensue; if in large quantity, the surrounding structure is infiltrated, and is found soft and of a pink color; or if the blood cease to flow, it may cause an inflammatory process in the surrounding tissue; or from the vessels being plugged, the adjacent parts may undergo a degenerative softening; but when the blood soon ceases flowing, it becomes circumscribed, and undergoes various changes, which, as I before said, are especially met with in the thalamus or corpus striatum, in old hemiplegic cases. First, the fluid part of the blood is absorbed, leaving a fibrinous coagulum; this dries, and, owing to the changes already mentioned taking place in the hæmatine, then becomes brown, and thus, in the course of two or three weeks after an apoplectic attack, you may find a shrivelled brown fibrinous mass; at a still longer period, this may become absorbed, and a mere dark line or kind of cicatrix remain. In some cases, a slight inflammatory action occurs around the clot, and a little lymph being effused, it becomes separated from the brain structure, and the latter is prevented from any degenerative changes; the fibrinous mass then, both by its own material and some inflammatory exudation, becomes enclosed in a cyst; still further, the remains of the clot may be absorbed, leaving merely a few shreds within, and the walls collapse, leaving a kind of cicatrix; or sometimes a fluid may be found taking the place of the fibrin, and thus a cyst be formed, holding some small membranous shreds within it.[1] I believe a true cicatrix is rare, but what appears like one is simply the effused blood in a linear direction. If the blood escape to the surface, it forms a layer which undergoes changes before mentioned, and may be found as a thin coating of an ochry-colored substance many months after the occurrence. The effusion of blood may arise in some instances from a *ruptured aneurism*, as I have already mentioned under arteries. It is highly probable that in young persons, where there is no general disease of the vessels, if the apoplectic portion of brain were thoroughly examined, an aneurismal condition might often be found, for such has sometimes been discovered when not expected.

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[1] 1575 and others; drawing 68^{50}, &c.

The so-called *serous apoplexy* is a disease of which I know nothing; it was a term formerly used to designate those cases of very speedy death with coma where no blood was discovered in the brain. There can be little doubt that the majority of such cases were instances of Bright's disease, and that death was due to what is now called uræmic intoxication; if you read the cases given by Abercrombie of the state of health of his patients, and all the accompanying symptoms, it can leave no doubt on your mind that many of them were instances of Bright's disease. Apart from such, however, we do occasionally meet with cases of very rapid death from evident cerebral affection, and yet scarcely anything to account for it found on examination; but as in these there is no necessary increased effusion, the term serous apoplexy cannot be used; it is a term I never adopt, nor do I know to what class of cases it is applicable. It is possible that some instances may have been of a kind such as I have mentioned under chronic hydrocephalus; where, for a long time, a chronic inflammatory action has been going on in the ventricles, and yet symptoms of death sudden, and very little found but increased fluid in these cavities.

INFLAMMATION, ENCEPHALITIS OR CEREBRITIS.—This may be general or local. *General inflammation*, probably, much more frequently happens than we can recognize after death. I have already, when speaking of meningitis, said that the surface of the brain and the ventricles are undoubtedly affected, and it is highly probable that very often the whole substance is also. The principal reason why we do not recognize it is that it is so speedily fatal, and before those changes have occurred which are apparent to the senses. Thus, in what is called acute mania, where the illness is of a few days only, very little change is observable, although there can be little doubt that a change, be it only a molecular one, has occurred. We do, however, occasionally meet with cases where, after a few days' illness of a cerebral kind, the brain presents points of softening and inflammatory product, indicating that a general cerebritis has occurred. In one or two such cases which I have in my mind, small discolored spots were found throughout the whole brain, both in the cineritious and medullary substance, and these were found to contain softened tissue and inflammatory cells, sufficient to show that the disease from which the patient suffered was one involving the whole of the brain. In more chronic cases of general cerebritis, you will have no difficulty in seeing the morbid appearances mentioned; the softening being to a greater extent. Thus, sometimes you will find a large portion of softened brain in the anterior lobe, another at posterior, another in cerebellum or pons Varolii, and in other parts. These are at once recognized when cut into by a scalpel. Occasionally there is actual loss of substance, and small spaces may be found occupied by fluid. In one remarkable case, the disease was more marked in the cineritious substance and the circumference of medullary matter, the whole of which was perforated by minute holes, giving it a worm-eaten appearance. Sometimes, also, we find the effects of a chronic inflammation in the form of small transparent albuminous deposits in the medullary structure.

Local Inflammation.—This is more marked, for the reason that, the remainder of the brain being healthy, the disease can advance to a considerable extent before it puts an end to life. I have already said that this may proceed after effusion of blood, but this is generally rather a mere softening or atrophy; probably some of the more marked cases arise after injury. A large portion of brain may be seen of a red color, intermixed with a yellow; the first is due to the increased vascularity, and the latter to an inflammatory product mixed up with the brain structure. On examination, some simple fibrillated tissue and nucleated fibre, due to the effusion of lymph into the structure, are found. In early conditions, the brain is more firm at these parts, but very often a softening process ensues, and then we find a cyst containing fluid, with sometimes a membranous wall around it and membranous partitions crossing it.

I have already mentioned that, although it is advantageous to study the diseases of the parts separately, yet that we find constantly that all the structures of the cranium may be inflamed; thus we had, not long ago, in the hospital two such cases, and which resembled each other in every respect, where the patients were ill with obscure cerebral symptoms for several months. In these the calvaria, as you see here,[1] had been inflamed, the whole internal surface being covered with minute bony granulations, the membranes also affected, and brain throughout its structure showing points of softening, and in one or two places large cysts, as you see in this drawing.[2] These were full of fluid, lined by a tolerably good membrane, and membranous partitions and fibres running across them.

Abscess.—Another result of inflammation is suppuration; this, however, cannot be looked upon as one of the ordinary termina-

[1] 1072^{55}.

[2] 1566^{20}; drawing 57^{51}.

tions, for, as I have already shown, these are rather indurations from exudations of lymph, or softenings, or cyst formation; so uncommon is it to find abscesses, that Dr. Gull has expressed his strong conviction that they either originate from without—that is, from disease of the skull, or are pyæmic in character—that is, secondary to local suppurations elsewhere. The most usual cases, no doubt, are those where the abscess is secondary to disease or injury of the bone, and thus it occurs either in connection with fracture or disease of the ear and os temporis. In the latter case the bone may be necrosed, the dura mater over it of a dark-green color, or sloughing, and the adjacent brain suppurating. This is not circumscribed, but extending into surrounding parts, and the matter is of a greenish color, often very viscid, and sometimes fetid. Abscess may also extend inwards from an injured skull. In some such cases, where the patient is young, and there is a disposition to recovery, an inflammatory lymph surrounds the abscess, and it becomes encysted. Of this you see a good example in this specimen,[1] which belonged to a skull which I have already shown you, as one of perfect union, eleven weeks after injury. You see this cyst is firm and well formed. In such a case as this, if all other circumstances had been favorable, I do not see why that cyst should not have remained there for many years, as it was in a part whose lesion is not incompatible with life; and in one case which I knew, there was every reason to believe that such an encysted abscess had existed in the brain for many years. Where the suppuration is *metastatic* or *pyæmic*, several abscesses may be found, as you see in this drawing,[2] not very circumscribed, but involving the tissue around.

SOFTENING, OR RAMOLLISSEMENT.—This is constantly used in a very vague sense, as denoting a condition of mere imbecility, or weakness of mind; but here we can only speak of that softening which is visible to our senses. It can be generally recognized by the loss of cohesion and pastyness of the brain matter; but if not, the microscope can detect the change. There is no case, I think, where the microscope can be put to such practical use as in looking for softened cerebral structure, for we not only find the tubes broken up, but mixed with them a number of bodies known as granule masses, and which you cannot mistake. These are large bodies, appearing black by the microscope, from not transmitting

[1] 1565^{86}. [2] 70^{76}.

light, and sometimes compared to mulberries, from being composed of a number of round bodies or granules, whose principal composition is fat. It was once thought that such bodies denoted inflammation; but you may find them in any degenerating part, as a decaying strumous gland, or a cancerous tumor, or a phthisical lung; and the question of their formation in the brain is not yet answered, whether they originate in inflammatory cells, or are the natural cells of the cerebral structure degenerated. In some you may still see a wall and a nucleus, which points to the former opinion as the more correct; be this, however, as it may, you can at once recognize these large dark bodies in the cerebral structure, and, once having done so, you know the part is diseased or softened, and this is generally all you require; you want to ascertain, in fact, whether a part of the cerebral structure is healthy or diseased, and the discovery of these bodies at once decides for you; it is a question of their presence or not, and nothing to do with any more refined matters regarding the shape or size of nucleus or cells: and it is for this reason I should advise you to make yourselves familiar with the appearance of softened brain and medullary structure. Softening of the brain I have already alluded to in connection with hydrocephalus, diseased bloodvessels, &c., and it is generally divided into the white, red, and yellow. The *white* is that where the structure simply becomes diffluent, and generally from atrophy, and thus is found in connection with disease of the bloodvessels. It is seen, however, in the central parts of the brain in tubercular hydrocephalus, which is in part inflammatory. The *red* softening is essentially inflammatory, and of this I have already spoken. It is that form of cerebritis which would rapidly go on to disintegration, and in which one of the first changes seen would be this softening, with increased vascularity; hence its name. And *yellow softening* is a term which some have given to what they have considered to be a distinct form of softening, and due probably to some chemical change in the proximate principles composing the structure of the brain. I can scarcely say that I recognize it as a distinct form; for it is not uncommon to find, on cutting through the brain, a large part of the medullary substance of a yellow color and swollen, but on examination it is seen to be more vascular, and some lymph effused in it, from which it has appeared to be merely another degree or shade of the red softening; at least I know this has been so in many instances.

Induration.—Where inflammatory exudation has occurred in any part, there an induration may follow, and thus a large portion of the brain may be found hardened, or small deposits of indurated translucent tissue may be met with. Both of these local forms of induration I have found; but a general induration, involving the whole brain, I have never yet met with, although such are described. Dr. Bright, for instance, in his *Medical Reports*, case xix., relates the case of a little girl, who, during a whole twelvemonth, had been imbecile, and had contraction of the limbs. After death, the brain was found shrunken, and the medullary part almost as hard as cartilage, so that when the cortical portion was removed it remained like a complete cast of the convolutions. The hardening, I suppose, was due to an inflammatory exudation into the medullary structure, and the more vital parts of the brain being unaffected, the induration went on to this remarkable extent.

Adventitious Growths.—These are of various kinds, and very often, I believe, pass into one another by insensible shades, and thus create a difficulty as to their exact definition. As a rule, tumors in the brain are found there as primary deposits, and nowhere else in the body, and this has led us sometimes to suppose that they are not malignant; but it must be remembered, that the brain being so important an organ, the disease is fatal before it can be elsewhere propagated, as would be the case in many other instances, were the organs in which the growth occurs equally vital; for example, a cancer of the breast is local for a much longer time than a tumor in the brain, and yet the fact of its being solitary does not prevent us calling it malignant, or cancer. We must not therefore, as I constantly hear said, call a tumor in the brain necessarily innocent because all the rest of the body is unaffected. A large number of the tumors, however, met with in the brain, are of a *fibrous* or *fibro-plastic* character, and have a local origin. When speaking of bone, I told you how difficult it was to distinguish often between a tumor and an inflammatory product; and so here, where we find within the substance of the brain a large firm mass, the size of an egg, the question at once arises in our minds, is it a tumor or inflammatory deposit? If we find a distinct cyst, or the mass circumscribed, we can have no difficulty in calling it a tumor; but even then you may remember, as I just now showed you, that a good cyst may form around an abscess in a few weeks; and very often these tumors are not so circumscribed, but gradually pass into the medullary substance around. Another reason for supposing that the fibrous or fibro-plastic tumors are the result of mere inflammatory deposit, is the fact that there is often a history of some inflammation arising from injury. A man, for example, after a violent blow on the head, begins to suffer some few weeks afterwards, until it is manifest that a tumor is forming; and after death, in course of some months, there may be found such a growth as you see in these specimens and drawings.[1] A firm greenish tumor, vascular, and which can generally be removed tolerably perfect from the surrounding brain structure. When examined, it is found to be filled with vessels and composed of nucleated fibres, but is not generally strictly defined from the cerebral substance around. These are perhaps the commonest forms of tumor met with; and it is a question whether such may not arise from syphilis (though probably, if from this cause, they choose the surface of the brain), seeing that occasionally cases are met with where all the symptoms of such an inflammatory deposit exists, and which all disappear under appropriate treatment. There are other forms of fibro-plastic tumor met with in the brain as elsewhere, though less common; thus in other parts of the body, as in the limbs, growing from the fibrous structures between the muscles, you meet with tumors which are firm, dry, and composed of nucleated fibres such as I have just mentioned; and you also meet with another form, which has a gelatinous appearance, is translucent and succulent, and composed of fibres of a very delicate kind. Both of these, when occurring in a limb, grow again very often after removal, and cannot therefore be called perfectly innocent tumors. The latter occur in the brain. They are semitranslucent, and look like white jelly, and can scarcely be separated from the brain tissue, the structure of the two being so much alike to the naked eye. In this specimen[2] from a case of my own, a large growth occupied the pons Varolii and the neighbouring parts, so that it was impossible to define it, and it was only by means of the microscope that the two structures could be accurately defined. It was found to consist of nucleated cells, with very long tender fibres proceeding therefrom. Probably this is the kind of tumor which has been called gelatinous sarcoma by some, or collonema by others. A *cancerous tumor* would be known by the ordinary characteristics of cancer, by its vascularity, by the milky juice which can be expressed from it, and by the

[1] 1576^{70}, and drawing 71^{15}.

[2] 1564^{35}, and drawing 72^{45}.

nucleated cells and nuclei seen by the microscope. If there be more than one such tumor in the brain, and if it be associated with similar ones in other parts of the body, there can be little doubt of its malignant if not cancerous nature; but when solitary, and the structure is partly composed of fibres and partly of cells, it is very difficult to class it either among the innocent fibrous or the malignant cancerous. My own opinion is, that such a tumor may hold an intermediate place between them; and although there are extreme forms of innocent and malignant tumors, yet there are various intermediate grades. Only lately, we met with a case where there were various tumors in lungs, brain, &c., of a simple fibrous kind, and having none of the characters of cancer.

Cholesteatoma, I have already referred to under Arachnoid.

Cysts in the brain, arising either from an inflammatory source or effusion of blood, I have already described.

Hydatids, also, I have mentioned as occurring on surface of brain in connection with arachnoid, and also in the ventricles. These have always been, I believe, the *cysticerci;* but the *echinococcus* is occasionally, though very rarely, met with in the substance of the brain, as you see in these old specimens.[1]

TUBERCLE.—I have already spoken of tubercle as affecting the membranes, and its being especially found in those portions of the pia mater which dip down between the convolutions; but when this material occupies the brain it is not in this form, but in large yellow masses; these are always very firm, and not disposed to break down, as seen in scrofulous deposits elsewhere. These masses, from growing in a soft organ, are generally quite round; and thus a globular tumor, the size of a billiard-ball, or even larger, may sometimes be found. These large scrofulous or tuberculous tumors are more frequent at the base of the brain than elsewhere, and thus very commonly met with in the cerebellum, which is their favorite seat. Sometimes, on removing the brain, a lobe of the cerebellum may appear, slightly altered in shape or size, and then, on cutting it through, a large uniformly smooth yellow mass is seen occupying this part, but having a layer of cineritious structure over it. Tumors in this neighbourhood press upon the surrounding parts, and produce various symptoms; amongst others, cause ventricular effusion, and give rise to symptoms resembling those of chronic hydrocephalus. I can call to mind two cases of chronic hydrocephalus where these large scrofulous masses existed at the base of the brain.

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[1] 1577, 1577^3.

Calcareous deposit, which is occasionally found in brain and membranes, probably results from such tuberculous deposits, as it appears to correspond to the same matter in the lymphatic glands after the cure of tuberculous disease.

Pineal gland is found sometimes to contain calcareous matter.

The *pituitary gland,* or *body,* may undergo morbid changes, and be subject to diseases, as other parts, and thus more than once have I seen it occupied by cancer. Owing to the large cells which it contains, with their numerous nuclei and pigment, it was suggested by Dr. Gull whether this body had any relation with the supra-renal capsules, which contain somewhat similar cells; I have, in consequence, looked in all cases of morbus Addisonii for any disease of this body, but have not yet found any appreciable change.

SPINAL CORD.

I shall divide this into the medulla and membranes, in the same way as the brain, and many of the remarks I have already made will equally apply here. Thus in idiopathic inflammations of the membranes the exudation is from the pia mater, and consequently beneath the visceral arachnoid, as in the brain; and only in very acute cases may a little lymph be found on the free surface of arachnoid, or only in very chronic cases is the latter involved in the adhesions. Whereas in those cases where we find a large quantity of lymph or purulent effusion within the interarachnoid space, the disease has originated from without, as from affection of the bones, and thus the same rule holds good in this organ as in the brain.

DURA MATER.

Acute Inflammation.—This membrane may be involved in an acute process in those cases where disease has penetrated from without, and with it necessarily the arachnoid. Thus in disease of the spine, the sheath of the cord may become involved in the inflammatory processes, and the same sometimes occurs from necrosis, arising from bed-sores; but the important effects are due to the arachnitis with which it is associated.

Chronic Inflammations.—Most of these changes seen in dura mater are of a chronic character; thus in disease of the spine, of which I have been speaking, after the canal has been reached, some lymph or scrofulous matter is poured out on outer surface of dura mater, and extends sometimes along it for a considerable distance, and thus thick layers of deposit are found covering it; the inflammatory process may extend through the membranes, or the tuberculous matter may be found protruding on the inner side. In chronic inflammation, where the bone is not affected, the medulla and all the membranes are involved, in the same way as in the brain; in such cases it is often difficult to say in what structure the morbid process commenced, or whether it has not proceeded in all *pari passu*. In these specimens you see the membranes adherent to the cord, and in this one[1] the dura mater is ossified, and in some parts forms a complete bony sheath around it; in this drawing you will see how it appeared by the microscope, consisting of true osseous structure.

Adventitious Growths.—Primary fibrous growths from the inner surface of dura mater, I shall speak of under arachnoid, and other forms of disease mostly proceed from without to attack this membrane. Thus in tuberculous disease of the spine, the sheath becomes covered and subsequently destroyed by it, or in simple inflammatory disease by abscess, and in the same way cancer, beginning either in the bones or around the spine, penetrates to the canal, and thus involves the sheath, or even the cord within. Many specimens of this you may see on our shelves.

ARACHNOID.

Malformation.—I have already spoken of spina bifida in connection with spine, where, from want of development and union of the posterior arches of the vertebræ, a protrusion of the membranes occurs, and a sac is formed; the most usual place for this being in the loins, and an average size is that of an egg or an orange. It is found that the dura mater is in close contact with the integument, and the two layers of arachnoid with it, and thus the fluid contained within, is in connection with the subarachnoid space, and through the fourth ventricle, with the lateral ventricles of the brain. In one remarkable case, belonging to Mr. Hutchinson, an open canal existed the whole length of the cord, and joined the ventricles with the sac.

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[1] 1562^{30}.

Inflammation (Acute).—This, as before said, is seldom a primary or indiopathic affection, but is one proceeding from without, and secondary to disease of dura mater or spine. Thus the cases in which it is witnessed are generally in connection with injury or disease of the bone, two or three examples of which we have had an opportunity of seeing during the last year; one was that of a lad who, having received a blow over the loins, an abscess followed which involved the vertebræ, and the purulent matter entered the spinal canal, so that when he died, three weeks afterwards, the interarachnoid space was filled with pus, and the inflammatory process had proceeded up to the brain, and there produced also an arachnitis. A very similar case occurred from a bed-sore, where, owing to necrosis of the sacrum, the lower part of the spinal canal was laid open, a purulent inflammation extended along the arachnoid, and also reached the skull. I have now seen several such cases. You may then remember that, as a rule, arachnitis of the cord, as of the brain, is a disease not idiopathic, but proceeding from some cause without.

Chronic Inflammation.—This may be found in the same cases as chronic inflammation of dura mater, where all parts of the cord are affected. In these chronic diseases of the cord the arachnoid may be found thickened and of a white color, or the two serous surfaces may be found closely united in parts, or by a few old adhesions or membranous shreds. This is one of the conditions we look for on examining the cord in cases of old disease: we first open the sheath or dura mater its whole length in front and behind, and, while lifting it up, we see if there be any unnatural adhesions to the visceral arachnoid below.

Adventitious Growths.—In the same way as *fibrous growths* spring from the arachnoid side of the dura mater of the skull, so do they in like manner from that of the spine; but they generally, in the latter situation, prove fatal before they have reached any size. Those which I have seen have generally been about the size of a hazel nut, of an oval shape, and attached to the inner surface of dura mater; and, by pressure on the medulla, have destroyed its texture, and produced death by paralysis in the usual way. The tumor has been firm, of fibrous texture, and, when microscopically examined, found to consist of nucleated fibres and small nuclei. The last case which occurred here afforded this specimen.[1]

Cancerous tumors have, I believe, been occasionally met with. I have never seen such primarily spring up here, but growths may proceed from without, and destroy the membranes.

One of the most common morbid appearances is the existence of *bony plates* on the visceral arachnoid of the cord—a condition not known on the brain. These are white, smooth, irregular-shaped plates seen on the arachnoid of the medulla, after the dura mater is removed. Their most frequent seat is the lower and posterior part of the cord, and in the cauda equina. They are perfectly white, like porcelain, or, when very small, like grains of split rice. When attempted to be removed, they are found firmly united to the membrane; for, though the outer surface is smooth, the inner is rough, and has a pyramidal shape, by which it forms close adhesions to the textures below. These have long been known by the name of bony plates, on account of their hardness; but of late the correctness of the appellation has been questioned, because often no bone can be found in them, and they have therefore been styled cartilaginous. I have never myself clearly made out cartilaginous structure in them; but when small they are composed, for the most part, of a dense fibre tissue, and when larger, you may find true bony structure; it is true that the canaliculi are short, and not well formed, but you may see them in this drawing proceeding from regularly arranged lacunæ. In some instances you may see the bone structure in process of formation in the fibrous matrix. As therefore, when large, they consist of bone, and this is their tendency, we may still call them bony plates. I cannot tell you why they arise, or what pathological condition they indicate, if any. Formerly, when it was the custom to examine bodies only in special cases, it was thought that such deposits occurred in connection with epilepsy, tetanus, &c.; but, now the examination of bodies is more frequent, they are commonly met with, and in the comparatively young as well as old. They probably give rise to no symptoms. Sometimes they reach a length of half-an-inch or more; you see a specimen here,[2] but there are several others on the shelves in the museum.

[1] 1562^{85}.

[2] 1562^{45}, ^{60}.

PIA MATER.

Inflammation.—This is a series of bloodvessels held together by cellular tissure, and lying immediately over the cord; consequently all idiopathic inflammatory exudations take place from it, and are collected beneath the arachnoid. This, you see, is analogous to what I told you with respect to inflammation of the membranes of the brain, that in this affection the exudation was not interarachnoid, or between the serous surfaces, as you might have thought by judging of the analogous instances in the other serous cavities of the body, but beneath the serous membrane or subarachnoid; and the same is true in the spinal cord. In *spinal meningitis*, therefore, we look for the products of inflammation on the surface of the cord itself, after we have removed the dura mater, and separated the serous surfaces; this affection is probably not so speedily fatal as the analogous one in the head, and when seen after death, is generally at least two or three weeks after its occurrenee. What first strikes the eye is, the remarkable irregularity of the cord, owing to the effusion of lymph within the arachnoid space; this space, you know, you can distend with air into a large sac, and this now having become irregularly occupied by inflammatory exudation, gives the whole surface of medulla a very uneven aspect. On cutting the arachnoid, the lymph is found beneath, as a tough yellowish-green material: in some cases it is more in front, and in others on posterior part of cord. Although, as I before said, simple arachnitis arises generally from without, and this subarachnoid inflammation from within, yet the latter may arise from an external cause, as injury.

Congestion and Apoplexy.—I have never seen a case of apoplexy of the spinal cord, but I believe such a disease has occurred, and given rise to sudden paraplegia. As regards congestion, the same remarks apply as to the brain; that very rarely is an active state of congestion, or one that indicates any real pathological importance, seen. Owing to the mode of death, and the body having been long supine, the veins may be found filled with dark blood.

Adventitious Products.—As the pia mater of brain is the favorite seat of tubercle, it might be thought that the same membrane in the spinal cord would be subject to it. This, however, does not appear to be the case, although I believe, in some cases of tubercular meningitis, these adventitious bodies have been found proceeding down the cord. Further observations on the subject are required.

MEDULLA.

Inflammation.—The most common affection of the spinal cord is inflammatory softening. This may arise from injury, though very often it appears to be idiopathic, as from cold; it commences as an inflammatory process, leading to an exudation, and ending in a softening or degenerative process; such cases constitute the majority of those of acute paraplegia which come before us. The patient dies after a few weeks' illness, with paralytic symptoms, and on examination, it is probable that the membranes may be found quite healthy, and the spinal cord alone affected. Even this may not appear altered to the naked eye, and its softening scarcely susceptible; it being only by microscopic examination that the degeneration can be discovered. If the cord has undergone softening, this is at once detected by passing the finger along it, when the softened spot is felt, and this, if cut, is found quite pulpy or diffluent. Sometimes, the microscope is necessary to detect the degenerative changes, so little altered is the consistence of the cord; and here, perhaps, more than in the case of the brain, is this instrument valuable. I told you, when speaking of that organ, that if the microscope found granule masses in the suspected structure, it was of the utmost importance, for it showed a diseased condition, which, without the discovery of these bodies, would have been altogether unrecognized by the naked eye. In the cord the same remarks apply, and if this be examined, and a number of these granule corpuscles be found, then we know a diseased action has been present, which is the great fact to be arrived at. Another question is as to the nature of the softening, whether it be allied to an atrophy or an inflammatory process; in cases of both affections these microscopic bodies are found, but in the large number of cases where the disease comes on suddenly in the young, it is probably inflammatory. Although the microscopic morbid appearances may often be discovered before any physical changes are seen by the naked eye, yet even the former take some time to be produced, and thus it sometimes happens that even this instrument may discover nothing: judging from cases I have examined, I think, if a case be fatal before the end of three weeks, these granular corpuscles will not be discovered. The changes which occur in the cord are numerous, and may affect various parts with various effects. Thus, one spot only may be involved, or the whole length of the medulla; in one case its anterior part, in another its posterior, and in a third the grey central structure is especially affected. It is highly important to make out these different forms of disease, in order to associate them with the symptoms, a subject being investigated by Dr. Gull in the *Guy's Hospital Reports*.

In long-standing cases of inflammatory softening of the cord, more extensive changes may be seen, as in the brain; softened material mixed with a white inflammatory product, as you see in this specimen.[1]

Occasionally, as result of chronic inflammation, a local induration may occur.

INJURY.—Cases are recorded where an injury to the cord has occurred, and recovery taken place. In these cases, however, an inflammatory product forming a fibrous tissue constitutes the uniting medium, and, as the structure is for ever injured, a loss of function or paralysis results. In fractures or dislocations of the spine, the cord within is often seriously injured, as you may see by examining our preparations. It is remarkable that in many of these the membranes are unaffected, but the mischief is caused to the medulla within by stretching and contusion, whereby the structure is softened into a pulp, and is red from effused blood. Sometimes we find the outside of the cord little injured, but the interior grey substance softened; this arises from its different structure and vascularity, which allows the blood to be more readily effused into it, and even to proceed some way downwards along its centre. Death occurs in these cases not so much from the amount of injury produced as from the particular spot affected; thus, the instances of recovery from fractured spine are those where the lower dorsal or lumbar are injured; where speedily fatal, the injury is high up in the neck, above the third vertebra; and in the more usual class of cases, where death occurs in one, two, or three days, the injury is at lower cervical or in dorsal region, so that the ribs being paralysed, and the only movement to aid respiration being by the diaphragm, the lungs become gorged, and death sooner or later inevitably results. Probably, where a violent blow has occurred on the neck and no displacement of the bones, the contusion of the cord may have arisen from concussion.

[1] 1562^{35}.

CANCER.—I never met with this as a primary disease of the cord, but I have several times seen it involving the cord, from growing inwards from the spine.

NERVES.

ATROPHY of the nerves arises from pressure, or is a mere accompaniment of a general atrophy of the part of the body which they supply. I have already shown you instances of the recurrent laryngeal nerve being wasted and almost destroyed from the pressure of an aneurism. In cases of dislocation of the arm, the circumflex and other nerves have been injured, causing paralysis. A spontaneous or *idiopathic atrophy* of the spinal nerves has been stated by Cruveilhier to be associated with the progressive muscular atrophy. This, I think, has not yet been confirmed, and, if true, not determined whether the muscle or the nerve is the structure first involved.

INJURY.—Experiments on animals have shown that, if a nerve be divided, new fibrillæ are formed, and a perfect union again occurs. In the human subject, too, we are sure that where the nerves are small, the same reparative changes occur, as, for instance, in a cut finger, where sensation is for a time lost and afterwards regained. We do not, however, witness such a union, or but very rarely, if the nerve be large, and, therefore, it is only in small nerves, and when patient is young, that we can expect to meet with this result. After amputation, the ends of the nerves very often become enlarged by an effusion of fibrinous material into them, and become *bulbous*, a condition which, in order to be distinguished from a somewhat similar one I shall presently mention, is called *traumatic neuroma*. In this preparation,[1] you will see what I mean; the nerves, as they approach the end of stump, become enlarged, and this you constantly see where there has been no complaint of pain; though very often, when adherent to skin and involving the cutaneous nerves, they cause excessive distress.

INFLAMMATION.—This is constantly spoken of in connection with various neuralgic affections, but is to a great extent hypothetical, as it is not often demonstrated after death. It is not unusual to find a nerve involved in an inflammatory process, as, for example, in a

[1] 1620^{8}.

stump, where it may be seen covered with lymph, and may, indeed, be the first stage of the bulbous condition already spoken of. You may find a nerve in this position covered with lymph or granulations, and enlarged. Such a condition of nerve has been often found in a wounded part where a fatal tetanus has occurred, and has been looked upon as the exciting cause; without saying that there is no connection between them, as very probably there may be, you may find such inflamed nerves without tetanus. Such an inflammation has been said to arise in the sciatic nerve, as a cause of sciatica, but I do not know that this has ever been demonstrated.

The most marked changes are of a chronic character, and when the new material is collected in large masses, the disease is called *neuroma*. The term chronic inflammation, however, might be employed where the parts are very much affected, as in this specimen. These nerves are from the upper and lower extremities of a woman who died lately in the hospital, and you will see that nearly every one is enlarged by an adventitious deposit; this consists of a simple fibre tissue, infiltrated among the fibrillæ, so that they are firmly united together and with difficulty separated; in some portions, a large mass is connected with a fasciculus, and this protrudes among the others, forming a nodule on the nerve, the other fasciculi passing over it. In other parts, the fibre tissue is diffused amongst the nerves, so that, on dissection, they are merely found separated by the new material. One of these, you see, is the size of an egg. In this instance, the pneumogastric nerves had similar tumors upon them. This complaint is not a painful one, and is not to be confounded with painful subcutaneous tumors, consisting of nodules of fibre tissue containing fibrillæ of sensitive nerves. Sometimes, one nerve may be affected, and if this belong to an important part, as an intracranial nerve, may lead to death. There is reason to believe that neuroma, in many instances, has a syphilitic origin, the adventitious material being of the simplest kind, as occurs in syphilitic nodes, &c. Occasionally, the tumor softens in its interior, and a cyst may be found within.

CANCER.—This often destroys nerves in its neighbourhood, but does not often involve them. In this specimen,[1] however, you may see the nerves of the brachial plexus enlarged by cancerous deposits, and which also continue along their branches.

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[1] 1620^{15}.

DISEASES OF THE SKIN.

EPIDERMIS.

Atrophy		Cicatrix, Lineæ gravidarum.
Hypertrophy	*General*	Psoriasis, icthyosis.
	Local	Callosities, corns, horny growths.
Alterations in Color	*White*	Vitiligo, Albinismus.
	Yellow and brown	Ephelis, lentigo, melasma, pityriasis.
	Black	Nigrities. Nitrate of silver.
Parasites		Pityriasis versicolor (Microsporon furfurans).

CORIUM.

Congestion	*Rose-colored rashes*		Purpura, petechiæ, &c.
Inflammation	Superficial	Papular	Lichen, prurigo, &c.
		Exanthems	Rubeola, scarlatina, erythema, roseola, urticaria.
		Vesicular	Eczema, herpes, variola pompholyx.
		Pustular	Impetigo, ecthyma, &c.
	Deep, or phlegmonous		General, as erysipelas. Local, as in boil.
Adventitious Growths	Fibro-cellular (diffused)		Keloid; Elephas; Elephantiasis, or lepra tuberculosa and anæsthetica; sclerema; molluscum; lupus, &c.
	Tumors		Condylomata and warts. Cancer; fibrous, medullary, and epithelial. Fibroid tumors. Steatoma. Nævus. Melanosis, &c.

Parasites	Sarcoptes scabiei. Acarus. Pulex penetrans. Filaria medinensis.

SUDORIPAROUS GLANDS AND DUCTS.

Miliaria, Sudamina.

SEBACEOUS FOLLICLES.

Cysts. Tumors. Follicular Papillary Growths. Acne Punctatum.

NAILS.

Ungues Adunci. Onychia. Inflammatory and Eruptive Diseases.

HAIR.

Atrophy. Color, &c.

Vegetable Parasites . . .	Achorion Schönleinii (Porrigo lupinosa). Tricophyton tonsurans (Porrigo scutulata). Microsporon Andouini (Porrigo decalvans). Microscoporon mentagraphytes (Sycosis).
Animal Parasites . . .	Pediculus capitis, pubis, &c.

ORGANS OF SPECIAL SENSE.

Eye.	Ear.	Nose.	Tongue.
Cancer, &c.	Inflammation.	Ozæna.	Glossitis, &c.
	Polypus.	Polypus.	Cancer.
	Gouty concretion.	Cancer.	Fibroid tumors.
	Hæmatoma, &c.		Ranula.

THYMUS GLAND.

Hypertrophy.
Atrophy.
Adventitious Products.

THYROID GLAND.

Hypertrophy (Bronchocele).
Cystic Enlargement.
Single Cysts.
Hyperæmia.
Cancer.

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SKIN.

I shall consider this under its separate parts, as far as is practicable, dividing it into epidermis, corium, and appendages.

EPIDERMIS.

Atrophy.—This of course occurs whenever the skin wastes, or is destroyed after sores or injuries, as seen in *cicatrices*, or when stretched over tumors; and can scarcely, therefore, be spoken of without considering the true skin. In a scar, the bloodvessels are again reproduced, as also are the nerves, as we know by sensibility returning; but I think it has not been shown that the perspiratory or sebaceous glands are again formed. Another form of atrophy is seen in the *lineæ gravidarum*, or the white lines occurring on the abdomen of women who have had children; these are owing to a contraction which occurs subsequently to distention, and, therefore, may arise after subsidence of dropsy, or other causes, and in men as well as women. The peculiar streaked appearance of the skin must be due to some anatomical arrangement of the fibres, whereby the contraction is unequal, leaving some parts depressed, which thus constitute these white lines.

Hypertrophy of epidermis, or increased growth of epithelium, may oocur over a large part of the cutaneous surface, and arise from a general or constitutional cause, or involve only a small part, from the cause being local. Of the first kind are *lepra* and *psoriasis*, of which the former is only a variety of the latter: an improved nomenclature making lepra apply, as in former times, to leprosy. Psoriasis is a morbid condition of the cuticle, whereby an increased quantity of scales is formed; and according to the amount and shape of the patches of disease so produced, so are various epithets given to them. When the epidermis is congenitally thickened, the name *icthyosis* is used; some remarkable examples of this you will see in our wax models,[1] and drawings,[2] and also in this piece of skin,[3] removed from a patient so affected. The cuticle projects in little hard processes, and these lying side by side, produce an appearance like the piles of velvet; and in some places so large

[1] 51. [2] 101^{10}. [3] 1621^{50}.

that they resemble warts. In less degrees, there is merely a thickened scaly epithelium. Of the second kind, or *local* hypertrophy of the cuticle, we see examples in *callosities*, and *corns*, arising from pressure. The former are seen on the palms of the hands of those who work hard, and in rowers; thick layers of epidermis being thus produced. Corns are mostly seen on the toes, as from tight boots, but may form on any projecting parts; they consist of an accumulated mass of epithelial scales, which lie superimposed, and rising up one over the other until they assume a vertical direction, the central part sinking down upon and into the true skin. *Horny growths* are composed also of a collection of epithelial scales, but they do not arise, as far as I know, from pressure, but from some other local irritation; a morbid production of epithelium takes place, until in time, long projections resembling horns are produced. If examined, they are found to be composed of these scales, lying one upon another; there is also amongst them a little fatty or sebaceous matter, but I do not know that they have their origin in sebaceous follicles. This specimen of a horny growth[1] came from an old woman, who, about twenty years before, noticed some scabs on her head and body, and these gradually increased in elevation during some years, until three horns appeared. These spontaneously dropped off; but they all began to grow again, and then a second time fell off; and this is one of the last crop. Here is another smaller one,[2] which Mr. Cock removed a short time ago from a man's lip.

ALTERATIONS IN COLOR.—These may depend upon a mere change in the epidermis, though more usually upon a deposit of pigment in the rete-mucosum. It is in this layer between the cuticle and the true skin that the color resides which gives the peculiarity to the dark races of man. If you examine our specimens of the skin of the Negro, or make sections for yourselves, you will see immediately beneath the epidermis, and corresponding to the papillæ of the skin, a dark layer of cells; these form the under layer of the epidermis, known as the rete-mucosum. In various morbid discolorations of the skin, a pigmentary deposit takes place in this tissue; but the most remarkable is that known as *melasma supra-renale*, in Addison's disease, where sometimes the whole integument becomes discolored, so as to resemble exactly that which belongs by nature to the dark races; indeed, in some cases no difference could be ascertained be-

[1] 1652^{5}.

[2] 1678^{5}, and drawing 230^{80}.

tween persons so affected and those born with dark blood. You may therefore, if you meet with one of these instances, clearly distinguish it from one of mere superficial staining of the skin by making a section, and observe whether the dark layer covers the true cutis, and runs everywhere in the course of the papillæ. I have this microscopic section by me, and you will see the peculiar color in these drawings taken from it.[1] Although the name melasma has been given by some, the term *bronzing* has been adopted by others, as the color is of a greenish-brown hue. A different affection is expressed by *nigrities,* where black patches appear on the skin; these have been found connected with chronic hepatic disease, syphilis,[2] and other disorders. *Ephelis* is applied especially to a temporary discoloration of the skin from exposure to the sun, as the name implies; while *lentigo* is used to the permanent affection, *freckles.* I might also bring to your remembrance the darkening of the skin so often observed in pregnant women, and especially remarkable in the breast and near the umbilicus. *Pityriasis* has been used rather loosely to denote a discoloration of the superficial epithelium, and has received various names according to its color. The pityriasis versicolor, the variety of which we usually speak, is due to a vegetable growth; but all other mere superficial discolorations are generally included under this term, pityriasis. There is another remarkable staining of the skin, which you see represented in these models,[3] and which is styled *Ephelis ignealis,* or *ab igne* (by Sauvages). It appears to occur in invalids who have sat for a long time before the fire and scorched their legs and arms; especially the former. You will see a number of reddish or brown lines coursing along the front of the leg, in the position of the superficial veins: the fact of a very exact resemblance to this, occurring as a post-mortem appearance, due to an imbibition of the coloring matter of the blood in the surrounding texture, would make it appear as if some similar cause was in operation in these invalided persons—that, in fact, such a change occurred in the vessels produced by the heat, that a permanent discoloration took place in their course. *Albinismus* is the state where color is altogether wanting in the skin, and is associated with the same want of pigment in the hair, eye, &c. *Vitiligo* is the term employed for a partial want of color; other conditions I shall mention when I speak of leprosy. Discoloration arising from *nitrate of silver* is very remarkable, and when once seen can never be for-

[1] 159^{67}.

[2] Model 246^{50}.

[3] $247^{5,10}$.

gotten, as the metallic lustre of the skin, and especially the face, is very striking. In these cases the internal organs have also been found discolored, the mucous and serous surface of the alimentary canal and the parenchymatous organs.[1]

PARASITIC GROWTHS.—The *pityriasis versicolor*, or *chloasma*, is due to a parasitic fungus, known as the *microsporon furfurans*, discovered by Eichstedt a few years ago. The disease is a very common one, and easily recognized in those buff-colored patches so frequently seen covering the chests of the poorer people, especially of those who constantly wear flannel next the skin, and do not indulge in habits of cleanliness. If some of these yellow parts of the skin be scraped on to a glass slide, and the latter be placed beneath a microscope, the epithelial scales will be seen covered with the sporules of the fungus. In order to discover them you should place on the specimen a drop of water, and then a little liquor potassæ, or carbonate of soda, in order to render the scales transparent, when the sporules are readily seen. These are small round globules adherent to the scales, and beside them you will see some long cells placed end to end, which form filaments, or the mycelium, as it is called.

CORIUM, OR TRUE SKIN.

The diseases of the skin are generally distinguished and treated apart from their actual anatomical condition; and this, no doubt, must be correct, when you remember that the cutaneous affection is often only a part, and sometimes that a small one, of a severe constitutional disease, as seen, for example, in the exanthemata; there are other affections, however, which appear to be strictly local, and still many others, styled skin diseases, in which it is difficult to say whether the skin alone is at fault, or the eruption a mere manifestation of some inward and more hidden malady. Whatever may be the cause, however, of a skin affection, it would be my place to demonstrate the anatomy of the disease, apart from any connection it might have with an internal disorder. Having said this, you might expect that I should demonstrate to you what the peculiarities are, but this, unfortunately, I am unable at present to do; although I have no doubt the real change in the skin, in all cutaneous affections, will at some future time be discovered. I think we can see how, in the exanthemata, a mere difference in the degree of congestion (due, of course, to some anterior condition) may cause a variety in the character of the eruption—as, for example, in scarlatina and measles—for nearly all the changes that occur in cutaneous disease take place on the surface of the true skin, in connection with a highly vascular tissue; thus, supposing a minute artery, dividing into its capillaries, supplies a certain number of papillæ, and a stagnation should occur in this vessel, a congested patch of a definite size results. Thus, no doubt, a certain fixed anatomical condition exists in scarlatina, another in measles, another in roseola, &c. In erythema, the redness is more general. In all these rashes, there is, probably, merely a congestion of the papillæ and bloodvessels. If the blood be diseased, and the due relation be lost between the vessels and the tissues, then it bursts forth and produces small effusions beneath the cuticle, known as *petechiæ*. Scarlatina, measles, smallpox in its first stage, may assume this character, but it is in typhus fever that it is more commonly seen. In this disease, the spots of the *mulberry rash* (as it is called), after a few days, cease to fade on pressure, and towards its termination, and especially if it be fatal, the blood actually transudes from these congested spots, and petechiæ are produced. In the typhoid rash, the rose spots never go beyond the stage of congestion. If blood transudes without any known cause, the name *purpura* is given to the disease. You will see, by looking at the table, that I have placed the exanthemata and many other rashes under inflammation, although I have just now said that they indicate simply a congestion; and this is, no doubt, true in their simpler and milder forms, but very often exudations do take place, and then we can call them none other than inflammatory. Thus, in scarlatina, you have often observed raised papules on the skin, and occasionally in these a small quantity of fluid is formed; and probably, even in all papular eruptions, even if no fluid is seen by the naked eye, some exudation really is present. In mere redness of the skin, then, there is simply a hyperæmic condition of the vessels; this is followed by an exudation from them, and thus is produced a papular or lichenous eruption, for, although the exudation may not be seen, we cannot imagine a visible elevation of the skin to take place without some exuded substance into it; a stage beyond this would end in an actual production of serum. You may have watched such a progress on yourselves; for example, when the hand is exposed on a hot summer's day to the sun's rays, you will first perceive a redness on its surface, and this is accompanied by redness, heat, and pain; you may afterwards perceive a lichen or papular eruption (in the East called *lichen tropicus*, or prickly heat), and at a later stage, small vesicles of eczema. Inflammation of the cutis producing vesicles, arising from other causes, is seen in *Herpes*, and in the large bullæ of *pompholyx*. In these vesicles, the fluid is generally alkaline. You can see again how a degree more of inflammation shall produce a *purulent* matter, and thus a pustule be formed, as in ecthyma, impetigo, &c. We ought thus to endeavour, if possible, to find out what are the exact anatomical conditions of the skin in its various diseases; this, of course, still leaving unexplained why a particular amount of inflammation should occur in one case and not in another, or why the rash is disposed to assume one form in one case and another in another, &c.

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[1] Since this lecture was given, a case of the kind has occurred to Dr. Weber, of the German Hospital, and I have examined some of the specimens from the many organs which were stained: slices of liver and kidney presenting very remarkable appearance, from the deposit being scattered through them in the course of the bloodvessels.

In *vaccinia* and *variola*, as you know, the vesicle—or, as it afterwards becomes, a pustule—is divided into a number of cells containing a specific fluid; the depressed or umbilicated condition so characteristic of the smallpox vesicle is said to depend on a hair running through its centre, but as the same is seen to occur on the palm of the hand, it must be rather due to the anatomical arrangement of the furrows of the skin.

When the *corium*, or *true skin*, is inflamed throughout its substance, we have produced *phlegmonous erysipelas*. In erythema, or superficial erysipelas, before mentioned, there is merely a swelling and slight exudation in the form of vesicles or bladders beneath the cuticle; but in this form, the whole depth of the skin and subcutaneous cellular tissue may be involved, when purulent matter is formed, and much of the texture dies, and is discharged in the form of slough. A local form of this inflammation is *faruncular*, and productive of boils. You must not look upon these as always commencing in the deeper parts, for you will constantly observe that they begin on the surface and spread downwards; if any of you have pricked yourselves in the dissecting-room, or poisoned the skin in any way, you will first perceive a redness and feel an itching, and then presently a small vesicle, the whole being superficial; but in the course of a few hours, the swelling and induration has increased, until you discover that the skin itself is involved, when suppuration occurs, with the discharge of a slough.

Adventitious Growths.—Although I place several diseases under this head, they might, I think, with almost equal propriety, have come under the last, and been ranked with chronic inflammation; but the difficulty exists in the skin, as elsewhere, in defining what is an inflammatory and what an adventitious product or tumor. For instance, I have just now spoken of inflammation of the skin and cellular tissue as phlegmonous, and now several chronic affections which I am about to name might be looked upon as a slower process of a somewhat similar kind; indeed, the results of the two are so much alike that they cannot often be distinguished. Here, for instance, is a drawing[1] of an arm, showing a cicatrix following phlegmonous erysipelas, but from the omission of an explanation of of it, it had been considered as a case of keloid, a disease which is eminently chronic, but which, in the course of time, produces the same wasting of the cutaneous tissues and cicatriform appearance. In this form of disease, which we call here the *keloid of Addison*, and which is represented in several models and drawings,[2] there appears to be an exudation of lymph or an albuminous matter into the skin and subcutaneous tissue, so that a swollen or brawny appearance is produced, as you see in this arm; but in several others, this stage is not seen, for an absorption or contraction immediately follows, and thus the disease progresses by the extension of an apparent cicatrix, and the marks on the limbs present, indeed, just the appearance of what a healed burn would do; indeed, not only are cases of keloid supposed by the ignorant to be the cicatrices of burns, but, as I just now mentioned, a real cicatrix might be mistaken for keloid, an error, indeed, I have also witnessed on the living subject. The *keloid described by Alibert* consists not so much in this cicatriform appearance as in the production of large circumscribed growths; these are peculiar: they project from the skin, are of a bright red color, and shining; they are vascular, and when removed are found to consist of a dense fibre structure springing from the skin.[3] These tumors often send off claw-like processes into the skin, and, a contraction taking place, an approach to the other variety is produced.

There are one or two forms of disease of the skin presently to be mentioned which link this affection to *leprosy*, or the disease to which *elephantiasis* has been applied. Unfortunately, under this name two different maladies have been included, although both occur in hot climates, and very often in the same locality, as in the West Indies. The one is a local affection, and the other a constitutional; in the one the leg is generally affected, and swells to an enormous size during a period of several years, while the patient is in good health: this is the Barbadoes leg, originally called *elephantiasis Arabum*, and styled in our museum *elephas*. The disease is due to an exudation of lymph into the skin and subcutaneous tissue, whereby the former is hypertrophied and an immense thickening is produced beneath it, and, at the same time, the fat is often much increased in quantity. The skin also becomes brown, as you see in our models, and a number of fissures occur, which subsequently change to oozing ulcers. This disease is more liable to attack those living in hot climates, and is probably the same disease, under another name, which affects the genital organs in India, producing the elephantiasis scroti; but, although this disposition is excessive in the tropics, we are by no means free from the disease in this country, both as it affects the legs and the genital organs. During the last two years, we have had three cases of this affection in the hospital; it was of many years' duration, and did not affect the health. In two cases, after amputation (and the specimens may be seen on the shelves, as well as another of the true West Indian[1] variety), I had an opportunity of making a section and observing the structure; the cuticle was very much thickened and of a dark color, the cutis was also thickened, and beneath there was a quantity of adventitious fibrous material and fat. The bone was healthy, and the veins leading to the diseased parts were exceedingly thickened. The state of the lymphatics was not made out.

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[1] 118^{80}.

[2] Models 225, 228, &c.; and drawings 158^{45}, ^{55}.

[3] Models 229 and 229^{30}; and drawings 158^{60}, ^{62}.

The other disease, which has also been called *elephantiasis*, has had the epithet *Græcorum* given to it. It occurs in the tropics, like the last-named affection, but we are more familiar with it as met with in the West Indies. To avoid confusion, it would be much better to confine the term elephantiasis to the local affection just described, and to the disease under present consideration apply the term *leprosy*, for the prevailing opinion is that it is allied to, if it be not the same disease with which the ancient Jews were afflicted. The term *lepra* has therefore been adopted by the French, and the modern use of that word, under the expression *lepra vulgaris*, been expunged, and this disease, as I before said, placed under psoriasis; but, as if there was a pleasure in confounding terms, no sooner is the word lepra adopted for the sake of distinction, than some writers again bring into it the local elephas, under the name *lepra hypertrophica*. The disease, as met with in the West Indies, appears under two forms,—the one where large protuberances appear on the face and elsewhere, which is styled in general terms leprosy, or in scientific nomenclature *lepra tuberculosa;* the other attended not so much with swelling, but with stiffness of the limbs and subsequent wasting, and is known popularly as the *joint evil*, but, owing to a numbness attending the disease, called scientifically *lepra anæsthetica*.

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[1] 1620^{60}, and various wax models.

The first form, or tubercular leprosy,[1] you may now see in a sailor who is in the hospital, and whose face and hands are thus affected. Owing to this albuminous exudation in the skin, it becomes swollen, indurated, and protuberances form, so that the most frightful and loathsome appearance is produced; the lips become much enlarged, the alæ of the nose expand, the eyelids thicken, and large folds of skin hang down on the cheeks and forehead; the hands and feet are generally similarly affected. The disease is not exclusively one of hot climates, for, a few years ago, a very interesting case occurred in a man who had never been out of London, and the models and drawings[2] of which, you here see. His face was affected in the manner I describe, producing this frightful distortion. He died with an ulceration of the larynx, a complication which is generally the immediate cause of death in Eastern climates. Very often, the skin of the whole body, although not thickened, is discolored, and covered by white and brown spots.

The other form, or *lepra anæsthetica*, is characterized by the shrivelling away of the fingers and toes, as you see in these models.[3] In the first instance, a mere numbness or loss of feeling indicates the onset of the disease, from which it is supposed that an albuminous material is effused in the course of the nerves, although I do not know that the seat of the effusion has ever been demonstrated. It is clear, from the swelling in some cases, that a considerable exudation does occur. This is soon followed by an atrophy of the limbs, so that the fingers and toes shrink away, leaving nothing but

[1] Model 232, &c.

[2] Model 236^{10}, &c.; drawing 194^{60}.

[3] Wasted hand, 233^{5}; skin of body, 233.

stumps, as you here see.[1] For further particulars of this interesting disease, I must refer you to a French work by Danielssen and Boeck.

I should say no more on this subject, had we not models showing some remarkable forms of disease, which, in all probability, are modifications of the ancient leprosy, and which seem to connect it with keloid, as I just now observed. If, as in the case of leprosy I just now mentioned, the disease may exist in this country in its perfection, and even run to a fatal termination, there is no reason why modifications of it may not also occasionally occur. This model[2] was taken from the face of a girl who, for many years, had this white depressed mark on the forehead; and this[3] other is from a woman who had a somewhat similar mark, but this was raised, although, in the course of years, it has undergone changes. There can be little doubt that such represent forms of disease which occurred in ancient times, and still exist in some parts of the East, and which were styled by Hippocrates *alphos, leuce,* and which have been translated into *vitiligo, morphœa,* &c. You will see that we have given these names to these very examples, and it is interesting to remark how nearly this *white depressed* mark corresponds with the Mosaic account, described in Leviticus.

There is a form of disease described by the French (I believe, first by M. Thivial) as *sclérème,* where the whole skin becomes shining and hard, as if from a general chronic inflammation of the cutis and subcutaneous tissue. I think I have seen one example of the disease.

Fibrous deposits may be seen in *syphilitic tubercles,* very often in *acne indurata* and in *molluscum.* This last affection, though formerly thought to be a mere undue secretion and enlargement of the sebaceous follicles, is not, I think, altogether proved; at all events, an actual growth of fibrous tissue takes place, as many of you saw in a very good case lately in the clinical ward; in this girl actual tumors had formed, one of which had been removed by a surgeon. The ordinary *molluscum contagiosum,* as it occurs in a child's face, you see in this model.[4]

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[1] Since this lecture was given, I have had a case of this affection under my care. The patient was a young man from the West Indies, and about half of his body was of a brown color, as if painted with tincture of iodine, and in these parts he had not the slightest sensation; there was no swelling except in hands, feet, and nose, but this was slight.

[2] 228^{15}. [3] 300. [4] 196.

Under *lupus*, so many forms of disease are included that it is difficult to define the term; under the division *exedens* and *non-exedens*, the most opposite diseases are included. In the first form there may be an adventitious deposit of a cancerous nature; but this has never been satisfactorily shown, the disease appearing rather like an eroding ulcer, which first destroys the soft parts and subsequently the bones. In the other form, which we are every day meeting with, there are also many varieties; and in these, no doubt, there is some morbid deposit which in one case is followed by a slight superficial ulceration, in another by a desquamation, &c. These varieties have been called *lupus erythematodes, scrofulide*, &c., and occur mostly in scrofulous subjects. One form has been thought to be due to disease of the sebaceous follicles. Time will not allow me to enter more fully into the details of these cutaneous and other diseases, and I therefore must satisfy myself with this outline of their general character.

Condylomata are new growths which will be described in the surgical lectures; they are the flat and softer varieties of local indurations in the skin, and are generally met with near the genital organs in connection with syphilis. *Warts* are new growths, accuminated or papillary. They consist of a mass of epithelial cells growing around one another and producing a cone, and in the midst of this is a loop of a bloodvessel. Sometimes, as you see in this drawing, which I lately made, you will perceive one cone sprouting out of another, and this indicates their mode of formation; for, although the papillæ of the skin may in the first place determine the papillary form, yet afterwards the processes shoot out and grow from the old ones—a fact which can be easily made out by careful examination. Although the papillary part is composed of epithelium, yet there is often a substratum of new fibrous structure, and sometimes an actual tumor, as seen in the warty growths from labia pudendi.

Adventitious growths, which are local and circumscribed, constitute TUMORS. One of the most important is cancer. As this disease varies much with the seat in which it grows, so in the dense structure of the skin it is generally of the *scirrhous variety*. One of the commonest examples met with is in cases of carcinoma mammæ, and especially after its removal, when the disease may be seen again returning in the skin in and around the cicatrix, as a number of hard nobules, and which, when examined, will be found to consist of nucleated cells imbedded in a fibrous matrix, the latter being principally the natural elements of the skin itself; so that when the growth has sprouted out still further, and away from the integument, it is softer, the matrix then being an altogether new formation. I must again make the remark, which I have repeatedly done before, as to the difficulty of defining many forms of maladies, seing that they pass by insensible degrees into one another, and thus you may conceive, that if a cancerous growth was very slow in its formation, and was of the fibrous kind, how much it would resemble keloid, and some other diseases already mentioned. Thus it was in a case last year, in the hospital, of a woman whose skin and subcutaneous tissue were indurated and brawny, and in some parts elevated into a number of small tumors, presenting the appearance seen in this model.[1] The whole trunk being affected, it could scarcely be said with certainty how far the new tissue was fibroid and allied to keloid or sclerema, or how far such a slow growth was carcinomatous, although, after some time, it was tolerably clear that it was of the latter kind. The woman dying some months after she left the hospital, I accompanied Dr. Habershon, whose patient she was, to make a post-mortem examination, when we found cancer in the bones and other parts. Such is a good example of *fibrous cancer*. When a large growth proceeds from the skin some distance, it becomes independent, and constitutes a *medullarg cancer;* and if very vascular, what was formerly called *fungus hæmatodes*. Another variety, *epithelial cancer*, or *epithelioma*, is altogether a local malady. I have just spoken of warts, and this form of disease is often warty on the surface, and therefore it is important to distinguish a simple from a cancerous wart—a distinction not always made. The difference lies in the character of the cells composing the new growth: in the simple wart these are of the normal kind, while in the epithelioma they approach to cancer, in the fact of the cells having larger nuclei; and especially from the presence of compound cells, which are considered to be characteristic of this form of disease. These are large circular bodies, composed of a number of semilunar scales surrounding and covering one another, forming so many coats, and producing what has been called the bird's-nest cells, or laminated capsules. They appear as if, in the excessive production of epithelium, the scales of the latter had wrapped themselves around a central nucleus; or, according to another theory, that a large mother cell having produced a brood of smaller within, one of the latter had grown at the expense of the others, which necessarily became flattened around it. The appearance of epithelial cancer is peculiar to the naked eye: instead of showing a vascular juicy structure, like ordinary cancer, it is dry, friable, and has a curdy look. The main seat of all such growths is an epithelial surface, where it is altogether local, excepting the affection of the adjacent glands. Very rarely the neighbouring parenchymatous organs may be involved when the cell structure is not so well formed, the elements being merely abortive epithelium. Here is a specimen of the disease.[1]

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[1] 50⁴.

Melanosis of the Skin.—This may be a peculiar form of disease, consisting of a mass of pigment; or it may be merely carcinoma, combined with coloring matter; and it is very remarkable that, very often, in these cases the character of the disease is determined by the previous presence of pigment in a mole. Thus in this drawing you see a black tumor on the arm which originated in a mole, and the disease after excision soon returned in the axillary glands, as cancer combined with pigmentary matter. In some cases, however, the disease is altogether peculiar: you see here a piece of skin[2] containing melanotic tubercles, and this is the drawing[3] of a man who was similarly covered, as well as having the disease in his internal organs. In this case the microscope showed the adventitious material to be composed of dark-brown masses of irregular shape, having no nuclei, and therefore scarcely deserving the name of cells.

Nævus I have already spoken of, and allied to it are mothers' marks and dark hairy patches, as you see in these preparations.[4]

In connection with the skin and subcutaneous tissue we have also fatty tumors, known as *steatoma*, *lipoma*, &c., of which you will see several large specimens on the shelves. Also various forms of *fibrous tumors:* those composed of simple fibrous tissue, which appear to be altogether local; those composed of nucleated fibre, which often *recur*, and may be called *fibro-plastic;* also another form, which recurs of a softer character and gelatinous appearance. These all differ from cancer, in being circumscribed, and not involving the neighbouring tissues.

I might here mention gouty or chalky concretions met with in the skin, sometimes in the ear and sometimes in the scrotum, as you see in this drawing.[5]

PARASITES.—Several of the animal kind affect the skin, and vary in different climates; the most common is this country is the itch

[1] 1638^{50}. [2] 1661. [3] 188^{26}. [4] 1650, 1650^{50}. [5] 184^{60}.

insect, the *sarcoptes*, or *acarus scabiei*.[1] This is not a true insect, for it belongs to the class arachnida; it has a rounded body, with eight legs, the four anterior being armed with suckers, and the four posterior with bristles, besides two pairs of mandibles armed with teeth. These creatures, inhabiting the skin, produce the pustules which are well known as characteristic of itch, and at the side of these pustules the acarus may be found; by scraping the skin, the ova and young ones may also be discovered: the female is larger than the male.

Another creature, of an allied species, is the ***harvest bug***, which some suppose to be an *ixodes*. I dare say many of you have been attacked by these tormenting creatures, while walking through a stubble field in the autumn: by scraping the place which itches, they may be procured on a piece of white paper, as minute red bodies.

Another well-known parasite I shall presently mention in connection with the hair.

In the West Indies a most tormenting creature is the *chigoe*, or *pulex penetrans*. It penetrates the skin, and there lays its eggs, producing in consequence an irritable sore. Whether our common flea, or *pulex irritans*, can be mentioned among the parasites affecting the skin, I am not quite sure; for though it lives on the juices of the body, I do not know that it lays its eggs therein.

The *filiaris medinensis*, or Guinea worm, is occasionally seen in the hospital, in sailors who have come from the coast of Africa and tropical climates. These long thin worms measure several inches in length, as you may see in these specimens,[2] which were removed from the surface of the body; the end protruding from the skin was secured, and the remainder of the worm gradually coiled out. It is supposed that they enter when very small through the perspiratory ducts of the skin, and proceed from the waters of the rivers; they are thus found in the legs of those who have been occupied in boats where water has lain at the bottom, or on the backs of those who have been employed in carrying water: they come in the rainy season, and attain their full size in about a year.

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[1] Drawing. [2] 2598^{35}.

SUDORIPAROUS GLANDS AND DUCTS.

I have not much to say in reference to these organs, but I may mention in connection with them, the morbid condition known as *miliaria* and *sudamina*. After febrile affections, when the cuticle is dry, the sweat collects beneath in small transparent drops; this fluid is generally acid when tested, and thus differs from the inflammatory exudation in most vesicular diseases, as eczema, &c., where the fluid is alkaline.

SEBACEOUS FOLLICLES.

A very common affection of these structures is an enlargement into cysts and tumors, especially on the head. A secretion continually goes on, until a tumor is formed, enclosed in a thin cyst. If the material constituting it be examined, it will be found to be composed of a mass of cells and plates of cholesterine: the former appear to have a formation between an epithelial and a fat cell; they are not dry and scaly as the former, and not round and full of oil as the latter, but they are of large size, with a faint nucleus, flat, and appear to contain some fatty matter; the cholesterine plates, too, are generally very abundant, and therefore the name given to this combination when occurring in other parts, as brain, ovary, &c., is *cholesteatoma*. The matter in the tumors resembles suet, much of which can be dissolved in ether. When these sebaceous tumors become large, they soften, so that the interior changes into milky or curdy fluid, while the cyst wall may be still thick, from the layers of cells upon it.[1] After all the contents have escaped, sometimes a growth springs up from the interior of the cyst, and a *warty follicular* tumor takes its place: for a knowledge of the character of these tumors, I believe we are indebted to Mr. Cock, who wrote a description of them in our *Reports*.[2] Since this account Mr. Birkett has had a case in the hospital, and which is represented in this drawing,[3] where the different processes were going on together in various parts of the body; you will see by this, as well as in the specimens[4] themselves, that in one place there is a solid tumor, in another a softened one, in a third an empty cyst, in a fourth a small papillary growth springing up from its floor, and here is a large warty tumor which has resulted from such a process. Growths of this kind have, no doubt, been frequently removed for epithelioma, and it is very probable that some of the supposed warty cancerous tumors on the penis may have been innocent follicular growths of this kind.

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[1] 1648 and several others.

[2] *Guy's Hosp. Reports*, series ii. vol. viii. p. 151.

[3] 176^{63}.

[4] 1654^{55}.

Molluscum.— I have already mentioned this disease in connection with the cutis, because in many instances the small tumors appear to be actually new growths of fibrous tissue.

Acne punctata is a closed sebaceous follicle, filled with secretions of a dark color, and sometimes contains a parasite called the *demodex folliculorum*.

NAILS.

Ungues adunci, or curved nails, in connection with phthisis, were observed as long ago as Hippocrates. This condition is found on the toes as well as the fingers, and is not peculiar to consumption, as it is seen often most marked in bronchitis; and I only lately saw it in a man, who for years had suffered with a chronic pleurisy destroying one lung; it appears, therefore, to occur in venous obstruction, of which phthisis is only one cause. Beside the curving of the nails, you will observe that the ends of the fingers are clubbed, as in this drawing and model.[1]

Onychia and *paronychia*, very painful diseases, affecting the root of the nail, accompanied by suppuration, and often its subsequent loss, are described by the surgeon.

There are also more chronic affections affecting the nails and their roots, as the skin elsewhere; as eczema, impetigo, or a less degree of inflammation, as in psoriasis. There is, however, a more remarkable affection, and which you may see in the living subject, in the cases of two or three women now attending my out-patient-room. The nails are all decaying and falling off, and this appears due to an inflammation at the root. In the first place, a redness is perceived at the spot, accompanied by heat and a little pain; but no visible eruption or exudation, and soon the root of the nail begins to change color and exfoliate, until the whole nail is lost.

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[1] Drawing 193^{75}, and model 82.

You will see in these women, that on some fingers there is merely redness of the skin, on others a portion of the nail gone, and on others merely a rim at the extreme end.[1]

The nails, if neglected, may grow very *long* and *curved* in all directions, as you see in this specimen.[2]

HAIR.

COLOR.—This has reference to turning grey, and begins, as is well known, on the temples, though in those prematurely grey I do not know that this is the case. Those who have investigated the subject, give full credence to the stories related of the hair turning grey in a few hours from excessive grief.

Atrophy and *falling off* of the hair constantly occurs after febrile attacks, where, no doubt, the whole skin has been diseased. In various chronic maladies, it partially falls off, and sometimes wholly so, not only on the head, but pubis, eyebrows, and the whole surface of the body. This I have never seen, except as a result of syphilis. When the hair comes off in patches, as often seen on the head, leaving a bald patch, the disease is called *alopecia*. It was formerly thought by Willan and Bateman to be dependent upon a pustular disease, which they called porrigo decalvans; but a baldness is by no means always preceded by such an affection, and the modern theory is, that the decay of the hair is due to a vegetable parasite which has received the name of the *microsporon andouini*. I think this is very doubtful; at least I have never been able to discover a fungus in any of the hairs surrounding the bald patch; and therefore it has still to be satisfactorily shown what is the cause of the withering and falling off of the hairs in this manner. There is another affection of the hair, which I do not think is described in books, but about which you will be sometimes consulted, and that is a *breaking of the hair*. Owing to the fracture, a white spot is produced; and if a number of these are present, as, for example, in the whisker, they have been mistaken for ova of pediculi, and alarmed the patient. If you examine one of these hairs, you may find it broken in one or two places, and thus presenting a nodulated appearance; and if then examined by the microscope, the fibrous structure of the hair will be found to be broken up into a brush; I have seen interspersed a few dark granules, but I never could make out distinctly any sporules of fungi. You see examples of what I mean in these drawings. The *growth of the hair* varies much in health and disease. The curly stiff hair generally denotes health, while a long straight hair breaking at its ends denotes the feeble and often phthisical subject. Such a distinction may be of value, with other signs, in assisting the medical man who has to examine a body as to the cause of death. If a patient has been long ill, and with a wasting disease, the hair is long and straight, both on the head and beard; but especially observable on the pubes, where it may be seen hanging in long straight tufts. In phthisis and some other wasting diseases there is often a disposition for it to grow, and thus the chest may have become recently covered with long straight hair.

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[1] Models 244^{10}, &c.

[2] 1652^{16}.

VEGETABLE PARASITES.—These have of late received a considerable share of attention, as it has been thought that some very important contagious diseases of the head are due to them. I have already mentioned one of these, the *microsporon furfurans,* as the cause of pityriasis versicolor; they are all more or less alike in being composed of simple cells and filaments: the cells are roundish or oblong, and vary in shape and size in different species. If the cells are long and placed end to end, they constitute branching filaments, or a *mycelium,* as it is called; upon these is placed the receptacle, or *sporangium,* containing the reproductive *sporules.* The structure of these fungi is best brought out by the addition of a little alkali to the slide. Amongst the most important is the *achorion Schönleinii,* which is the cause of the tinea favosa, or, as you will still see it called in some of our drawings and models,[1] *porrigo lupinosa,* after Willan and Bateman. I refer to the disease characterized by large yellow raised cup-shaped masses growing on the surface of the skin, and more particularly on the head. If these crusts be examined, they will be found surrounding the hairs, and composed of large oval sporules and a mycelium, as I have just mentioned. They may be found in the follicle, but do not necessarily destroy the hair. The *tricophyton tonsurans* was first described by Gruby, in 1844, as the vegetable fungus which causes ringworm or tinea tonsurans, or, according to our old nomenclature, *porrigo scutulata.* I allude to that disease of the head where there are patches covered with short broken hair. The sporules are found to have entered the sheath of the hair, and crept upwards into the stem, so that it decays and breaks off short. The sporules are rounder and smaller than in the preceding variety, and distinct filaments are not so easily seen. You will remark, that in this disease the parasitic growth gets into the fibrous structure of the hair itself, and not merely around it, as in the *faveuse*. The *microsporon andouini* I have just mentioned is a fungus believed to cause the falling off of the hair in alopecia, but this I have never yet seen. The *microsporon mentagraphytes* is another species which is found in the sheath of the hairs of the chin, constituting the disease known as sycosis. I have frequently pulled out hairs and seen the sporules, but I could not say that this was so in all forms of the disease, and that the pustular eruption met with is always due to this parasite. Moreover, it requires a long practice with the microscope to be able to detect the differences in these fungi, which so much resemble one another; and I, for my part, do not know how this fungus differs from the trichophyton of ringworm already mentioned. It is stated also that a species of tricophyton may be found in the peculiar disease of the hair occurring in Poland, where it becomes matted together as you see here[1] in this specimen of *plica Polonica*. I am not at all decided that these parasites actually constitute the disease, and that they are not accidental; indeed, I think a vesicular eruption may often be seen to precede their appearance.

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[1] Drawing 123^6, and model 111.

Animal Parasites.—These are the *pediculi*, or lice. The most common are the *pediculus capitis* and *pubis*, the latter also called *phthirius*. The great difference between them is the length and shape, the one being long and the other of a squarer form. These are distinct species, and will not occupy the habitat of each other. Another species of phthirius affects the eyebrow. As lice are especially seen on sick people, it is thought a special genus attacks them, and this is called *pediculus tabescentium;* but of the truth of this I cannot speak. It is also said that the creatures which one sees crawling on the clothes of beggars form a distinct genus, the *P. vestimentorum.* The eggs of lice are attached by a gummy substance to the hair, where they may be seen sticking in rows when the hairs are plucked out.

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[1] 1652.

SPECIAL SENSES.

Following the course prescribed by our catalogue, I am now come to the organs of special sense, but, as there are distinct courses of lectures on the diseases of some of these, I shall scarcely touch upon them; and, were I to attempt to do so, the diseases which would be demonstrable are few in number. I shall, therefore, merely refer you to those which can be displayed on our shelves.

Under the EYE are preparations which refer mostly to organic diseases, though I hope, by novel and improved modes of preparation, we shall be able to preserve some of the appearances displayed by more delicate morbid processes. You will see how common is melanosis of the eye, and this probably has reference to the presence of pigment in the choroid coat. The arcus senilis, or fatty degeneration of the cornea, is a subject of late much studied, and it is interesting that the bony degeneration of the eye which sometimes occurs in old withered eyes consists of true bone; this is a fact as old as Morgagni, but it is of interest in connection with what I said in my last lecture respecting the change into true bone of the cerebral and spinal membranes, since the sclerotic is a continuance of the sheath of the optic nerve.

EAR.—The most important affections of the ear are those which are connected with the sensory and internal parts, and constitute a study by themselves. After long-continued inflammation and other changes, the grosser alterations are destructive of the more delicate portions of the organ, and the filling of it with a cheesy matter, and sometimes a disease of the bone itself. It is in this last stage that it comes before us in the post-mortem room, when the petrous portion of temporal bone is necrosed, and the membrane within, or dura mater, is involved, and finally the brain itself. This I have already referred to, with the occasional implication of the lateral sinus and jugular vein. In the *meatus* you may find *sebaceous cysts*, and occasionally *polypi* of a fibrous character, as you see in these bottles. I have already alluded to *gouty concretions*, which may sometimes be met with just within the meatus. There is also a very remarkable swelling of the ear, which is met with in lunatics, of which I formerly saw many cases at Hanwell, when I attended Dr. Connolly's classes. A swelling and inflammation takes place just within the auricle, and when opened, a bloody fluid comes out, and thus it has been styled *hæmatoma auris.* It is difficult to see why such an affection should occur in mad people, and, therefore, it has been thought by some to be merely the result of an accidental blow.

NOSE.—There are various inflammatory affections coming daily under our notice, of which a chronic affection of mucous membrane is called ozæna, or, from the fact of its occurring so constantly in scrofulous persons, *ozæna scrofulosa;* in some of these cases, concretions form. The bone may become affected; but generally, when this is the case, the cause is syphilis. *Polypi* of the nose are frequently removed by the surgeon; they are called mucous polypi, are soft, gelatinous-looking, and consist of a fibro-cellular structure —that is, nucleated cells with a minor proportion of fibre—highly vascular, and the surface is covered with ciliated epithelium. It thus forms a very beautiful object for the microscope; and, on the next occasion when a polypus is removed, if you snip off a piece of the surface and place it beneath the microscope, you will see nucleated columnar epithelia, with their edge furnished with cilia in constant vibratile action; you must place it in a little of its own juice, for if you put water you will stop the motion. Growths from the mucous surface may occasionally be cancerous, as I have more than once seen.

TONGUE.—The diseases of this organ are various, but specimens of which I cannot show you. Thus, you may meet with inflammation, or *glossitis;* an example of this you may see here,[1] of an immensely hypertrophied tongue, and which was the cause of the woman's death in the course of a day or two. In chronic cases, an effusion occurs in the substance, and the swelling may remain for a considerable time. *Ulceration* may also occur of a simple character, or may be syphilitic or aphthous. Isolated *tumors,* also, may occur in the tongue, of which I have already mentioned *cancer;* this is of the epithelial variety, and does not spread beyond the contiguous parts and adjacent lymphatic glands. This form of disease affords a very striking object for the microscope, in the aspect of the large single or mother cells amongst the muscular fibrillæ. *Fibrous* tumors may also form in the muscular substance of the tongue; these are generally syphilitic, but not always so, as sometimes simple isolated thickenings may be found at dorsum of tongue. You may now see a patient of mine in the hospital whose tongue is covered with warts, and presenting a very remarkable appearance. *Ranula* is a disease consisting of a cyst beneath the tongue; this was formerly thought to be due to the obstructed salivary duct, but cysts form quite independently of this, and occasionally such obstruction does occur from the presence of a calculus, when a cyst may form.

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[1] 1670^{60}.

THYMUS GLAND.

As nothing is known of the function of this body, so, little of its pathology. It is said, sometimes, to be found *atrophied* in newborn children, showing that it must have undergone a change in fœtal life. Sometimes, in children, it is found large, and is said to be *hypertrophied;* in some cases I have seen, the gland too large, but this has been due rather to a persistence of its earlier state, and not to any actual increase in size. I have seen this at the age of four and five, but never, that I am aware of, attended by any symptoms. It is thought, however, by some German writers, that such enlargement may cause pressure on the air-passages, and give rise to what they call *thymic asthma;* but I have no experience of this. Occasionally, tubercular disease has been found in it, and, I believe, cancer. Among our preparations we have this one,[1] of enlarged thymus, and this other,[2] which is cystic; but I am doubtful as to the latter being the organ at all.

THYROID GLAND.

The most common form of affection of this body is its *enlargement*, as seen in *bronchocele* or goitre, when it often reaches an immense size, but less degrees of its enlargement are constantly met with on the post-mortem table. Sometimes, these enlargements appear to be *simple hypertrophies*, the tissue being close and uniform; but very often the size is due to a jelly-like or colloid matter being formed in the interior of the organ, and sometimes the loculi dilate into large cysts filled with this gummy substance. The latter, when in great quantity, is fluid, but sometimes is as firm as wax. Several specimens[3] are before you of these *hypertrophied* and *cystic* thyroid bodies. Besides this general change, very often distinct and isolated cysts are formed, growing from one lobe or the other, and attain a very great size; and sometimes the walls of these *ossify*, as you see in this specimen.[1] Knowing that such are not uncommon, it is not surprising that an hydatid cyst[2] which Mr. Cock removed a short time ago from the thyroid should have been looked upon as part of a bronchocele. The thyroid may also temporarily enlarge from hyperæmia, and Dr. Stokes says he has repeatedly observed this in heart disease; I have never seen this, but, now attention is drawn to the subject, it is probable we may meet with it. I have seen this body involved in inflammatory and suppurative processes in the neck, but not, I think, primarily so. Tubercle I have never met with, and *cancer* but rarely; only on two or three occasions, and then, from the fact of the neighbouring lymphatic glands being implicated, it was questionable whether the disease had not commenced in them. This[3] appears to be a specimen of the disease. A case occurred about two years ago, in the hospital, of a man who died of sloughing of the thyroid, and which was thought to be cancer; but no cancer existed elsewhere, and, moreover, the enlargement appeared due to a more simple exudation, and which was highly vascular, for, during a long period, constant hæmorrhage had been present.

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[1] 1559^{60}.

[2] 1559^{75}.

[3] 1711^{28}, ^{35}, ^{50}, ^{77}, &c.

[1] 1711^{56}.

[2] 1711^{60}.

[3] 1691^{50}.

DISEASES OF THE RESPIRATORY ORGANS.

AIR PASSAGES.

Larynx. Trachea. Bronchial Tubes.

- **Dilatation . . .**
  - General.
  - Saccular.
- **Contraction . .**
  - From pressure.
  - —— disease.
- **Hyperæmia.**
- **Inflammation and Results.**
  - Catarrhal.
  - Plastic.
  - Pustular (variolous).
  - Ulceration . .
    - Catarrhal.
    - Aphthous.
    - Tuberculous.
    - Syphilitic.
    - Typhoid.
  - Œdema glottidis.
  - Chronic laryngitis.
- **Diseases of Cartilage.**
- **Ossification.**
- **Adventitious Growths . . .**
  - Warty growths.
  - Polypi.
  - Cancer.
- **Injuries.**
- **Foreign Bodies.**
- **Sputa.**

PLEURA.

- **Inflammation .**
  - Acute and chronic . .
    - Serous effusion.
    - Purulent, and empyema.
    - Fibrous change.
- **Adventitious Growths . . .**
  - Fibrous.
  - Cartilaginous.
  - Osseous.
  - Tuberculous.
  - Cancerous.

- **Morbid Contents**
  - Air—pneumothorax.
  - Serum—hydrothorax.
  - Blood.
  - Contents of stomach.
  - Misplaced viscus.

LUNGS.

- **Hypertrophy.**
- **Atrophy.**
- **Condensation**
  - Carnification.
  - Atelectasis, or apneumatosis.
- **Emphysema**
  - Vesicular.
  - Interstitial.
- **Hyperæmia**
  - Hypostasis.
  - Splenization.
- **Apoplexy**
  - Circumscribed.
  - Spotted.
- **Œdema.**
- **Inflammation**
  - Acute
    - Simple, with various stages.
    - Lobular.
    - Vesicular, or catarrhal.
    - Typhoid.
    - Hypostatic.
    - Gangrene
      - diffused.
      - circumscribed.
  - Chronic
    - Local induration.
    - Cirrhosis.
- **Phthisis** Tubercular, pneumonic, &c.
- **Adventitious Growths**
  - Cancer
    - Local, or primary.
    - Diffused, or secondary.
  - Melanosis.
  - Recurrent fibroid.
  - Osteosarcoma.
  - Osteoid cancer.
  - Enchondroma.
  - Myeloid.
  - Tubercle.
  - Hydatid.
  - Pigment.

AIR PASSAGES.

These are divided into the LARYNX, TRACHEA, and BRONCHIAL TUBES. In many cases I shall have to speak of these parts separately, but, as they are so often the subject of disease at the same time, I shall prefer taking the morbid conditions one by one; and then, if need be, show how each individual part is especially affected.

DILATATION.—Such a condition of the *trachea* has been mentioned by Rokitansky as occurring in its posterior part in old people, but I have hitherto failed to find it; and I therefore shall pass on to *dilatation of the bronchi*. This has been divided into various kinds, but I will only mention the *two* principal varieties, as they, for the most part, correspond to two very different pathological conditions. One is a *general* and uniform dilatation, and the other a *saccular;* the first is associated with a mere collapsed condition of the adjacent lung tissue, and may be a primary affection; while the latter is connected with a structural change in the same part, and is a secondary process. To commence with the saccular variety: of course I mean by this term a condition of tube where such a state is approached, and not where distinct sacs are formed, which is rarely the case. Such dilated tubes have long been observed in the upper lobes of the lung in connection with chronic pneumonia, and in the similar indurated condition of tissue in phthisis; in these cases, where a vomica has been suspected, but a mere dilatation of a tube found, it was formerly thought that the latter had preceded the induration of the tissue; but some years ago the opposite theory was propounded by Corrigan, that the disease of the lung substance preceded, and caused the expansion of the tubes. He studied the subject, especially in those cases where the lung was diseased throughout, and converted into a fibrous tissue, and therefore styled *cirrhosis;* but the same holds good where portions only of the lung are affected, as before named. This theory, which I have no doubt is the correct one, is, that owing to the chronic change in the lung, and its conversion into a new fibrous tissue, a contraction ensues, and that as a consequence the bronchial tubes are drawn open; just as during the same contractile process, the walls of the chest are drawn in. Thus, you see in these specimens of cirrhosis,[1] the lung tissue is quite gone, and its place occupied by a dense fibrous structure, and through it are running these large irregular spaces which have originated in the expansion of bronchial tubes; the same thing you may see in most cases of phthisical lungs, if the disease be of any standing. In such cases you will constantly hear the question asked, whether the cavity or hollow space is one formed in the substance of the lung, or is a dilated tube; but it is very difficult to decide with certainty, and, indeed, it is often a mere question of words, for the cavity becomes so altered by dilatation, that the mere continuity with the tube is not sufficient to prove the point; for, supposing in the first instance a tube should dilate, it afterwards increases at the expense of the pulmonary structure, and in the mean time the original character of the bronchus is lost. The other form, or *general dilatation* of the tubes, is less frequent, and it is not quite certain whether or not it be due immediately to a contracted state of the tissue, since the commencement of the disease is a bronchitis. It is found in long-standing cases of this disease, especially in children, where it has succeeded to a hooping-cough, as you see in this specimen, and which will explain the nature of the affection. This lung[1] came from a boy who had suffered from severe bronchitis (or asthma, as it is called), for many years, and the physical signs suggested cavities at the bases of the lungs; these organs, however, were in this condition: the primary and secondary divisions of the bronchi are natural until the lower lobe of the lung is reached, when the tubes become expanded, and occupy the greater portion of its lower part like the fingers of a glove; they get wider and wider until they reach the bottom of the lung, when they abruptly end, being there as large as the primary branches of the bronchi themselves; other parts of the lobe show these large spaces or cavities, which are sections of the tubes. A very similar case, but even more extreme, has only lately occurred to me, where the tubes of the lower part of lung were thus expanded; their healthy character had almost disappeared; the mucous membrane was red, swollen, and villous, while the walls were thin; and this reminds me, that in the other or saccular form they are generally thickened, from being involved in the fibrous induration around them. You can see that a dilatation of this kind cannot occur without the intervening tissue being contracted; in the other variety these two conditions are associated, but there the primary disease is in the parenchyma, but here the bronchitis is the originator of the disease. In this specimen, the intervening lung tissue was of a dark color, tough, and airless; in fact, the air had been squeezed out of it, producing that state which is known as carnified: this is just what you might imagine, for, as the lung occupies a certain bulk, one part cannot expand without another contracting, but it is not quite certain which process occurs first. If it should be the tube, it cannot arise unless from an inflammatory softening process; but if this does occur to a certain extent during life, it is doubtful whether the force of air during inspiration would be sufficient to cause a permanent change of the kind; it is therefore more probable, that during the progress of the bronchitis and the blocking of the smaller tubes, the air does not find ingress into the cells, and thus collapse of the tissue occurs, and in consequence an expansion of the walls of the adjacent tube. Probably, therefore, the two conditions which are found together, and necessarily associated, are going on at the same time; but I shall speak further on this matter presently.

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[1] 1718^{60}.

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[1] Wet specimen; also drawing 246^{90}.

CONTRACTION.—From *pressure* without; thus the trachea and bronchi are constantly found compressed and flattened by aneurism of the aorta, and more rarely by other tumors. Mr. Wilkinson King wrote a paper in our *Reports* showing that the enlargement of the left auricle, which occurs in some forms of cardiac disease, exerted a pressure on the left bronchus; I cannot say much in confirmation of the statement, as in the absence of all permanent alteration of shape, found after death in the tube, it is very difficult to prove. Constriction may arise from *disease within*, as from contraction of an ulcer, as you see in these specimens of trachea,[1] and this one of contracted bronchus,[2] where you will perceive that the tubes are diminished to half their width: the former appearing as if a tight ligature had been placed around them. In all these cases, the patients were *syphilitic*, and there could be no doubt that this was the character of the disease; such, also, has been the case in the few other instances I have seen. Such examples may be known during life, not only by the physical signs of the contraction, but by the very frequent discharge of portions of the cartilaginous rings from coughing.[3]

CONGESTION AND HYPERÆMIA.—As I have already mentioned, in speaking of other organs, it is very difficult to say where congestion ends and inflammation begins, and this is especially the case in the bronchial tubes: indeed I believe here, as in some other instances, the one passes into the other. This is especially seen in heart disease, where the state of the mucous membrane appears to arise in the first place simply from congestion, but yet in course of time assumes a character which cannot be called any other than subacute inflammation. Rarely, except in most acute forms of bronchitis, is the lining membrane of the tubes seen to be so red as in cardiac disease; it is often of the most intense character, and, at the same time, the tubes are full of a purulent mucous secretion. A similar condition will be found often in stomach and intestines, as I shall hereafter mention. It appears as if owing to the tension of the bloodvessels; in heart obstruction, not only is a serum poured out from the serous surfaces, but an analogous mucous secretion from the mucous. This cardiac congestion of the tubes is only an extreme form of what is constantly met with in less degrees in other diseases, where there is obstruction in the circulation, and the lungs are gorged; as, for example, in disease or injury of the spine, productive of paralysis of the chest, the blood may be found almost bursting through the tissue. The congestion may be also passive, as in fever and in blood diseases: here the redness is often considerable; and in a large number of other cases which I have not time to mention.

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[1] $1697^{50}, {}^{75}$.   [2] 1718^{72}.   [3] 1711^{87}.

INFLAMMATION OF THE AIR PASSAGES.—The simplest form is called *catarrhal*, where the mucous membrane is inflamed, and a fluid secretion pours from its surface. It may arise as an idiopathic affection, though it is constantly occurring in connection with other diseases; it is difficult to tell how long it has existed from mere inspection of the tubes, or from the amount of secretion poured out; for this may be very excessive without any great inflammation. The inflammation of the mucous membrane is known, in the first place, by the secretion found on its surface; this, if it be of a muco-purulent character, or apparently altogether purulent, shows that the inflammation is violent; but it is rather from the character of the membrane itself that the disease is told, for not only is there an exudation from the surface, but also into the membrane, and thus it has a swollen appearance, and the surface is velvety, or granular, besides being highly vascular. When the larnyx is affected, the disease is styled *acute laryngitis*, the urgency and importance of which is in proportion as the glottis and upper part of the tube is affected; and thus in fatal cases, where an opportunity is presented of seeing the organ, we generally find the glottis of an intense red, and so swollen that it is almost closed, the epiglottis also involved, and the parts below showing ordinary signs of inflammation, with secretion.[1] We have seen lately some instances of most intense inflammation of the upper part, or glottis, arise from local causes in children who had swallowed boiling water and acrid poisons: in these cases the glottis and epiglottis were intensely inflamed and swollen, and produced suffocation. I would here remind you that suffocation does not necessarily indicate a complete stoppage of the passage, as the closure is due in part to a spasm arising from the irritation. Such acute inflammation is often the sequel of chronic disease, as syphilitic laryngitis, &c.; and in some cases, death is produced by closure of the passage, where, on examination, no redness is present, but merely swelling; and this condition is styled *œdema glottidis*. It is often a mere dropsy, or exudation of serum into the cellular structure, and is thus met with in Bright's disease. You will see in these specimens, and very often better still in the post-mortem room, how the glottis is swollen and almost closed by this œdema, and sometimes the epiglottis at the same time.

If the inflammation should affect the trachea in an especial manner, the affection would be called *tracheitis;* but I have never seen this tube affected without other parts; and I shall therefore pass on to the bronchi, and speak of *bronchitis*. This is characterized, also, by the state of the membrane and the secretion from it; as a rule, the more purulent the matter thrown out, the more acute is the disease, and this is generally also in proportion as the smaller tubes are involved; and thus I would advise you always to open carefully the ramifications of the bronchi, for you will find more there to account for the symptoms and death than in the larger passages. Thus you will sometimes discover them completely filled with very tenacious purulent mucus, and on making a section of the pulmonary tissue, you will see small drops of thick matter ooze out of the minute tubes: a most important morbid condition, and one you should always look for. At the same time the mucous membrane presents a red, swollen appearance, and its healthy character almost gone—looking, indeed, more like a bleeding fleshy surface; and on section these tubes appear almost closed from the increased thickness of the mucous membrane. If the tubes are distended, as I just now mentioned, the original character of its walls appears quite destroyed.

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[1] 1694^{61}, 1696^{40}, &c.

Plastic or *croupous inflammation* affects the air-passages, the exudation being membranous instead of muco-purulent. The most important affection of this class is that known under the name of *cynanche trachealis*, or croup, a name which appears to denote that the windpipe is alone affected, but in all fatal cases which I have examined the whole of the air-passages have been inflamed; but this may be a reason for supposing that, in instances of recovery from croup, so extensive an inflammation could not have existed, and certainly there is no reason to suppose that a *bronchitis* must necessarily accompany an inflammation of the main passages; but I think there is every reason to believe, both from symptoms and necroscopic examination, that the *larynx* is involved. My own opinion is, that in croup the larynx and trachea are always affected, and in more severe cases the bronchi also. After stating what parts are involved in croup, another question arises—is it a peculiar form of disease; or is it merely the mode in which acute inflammation of the air-passages shows itself in children? It has hitherto been looked upon as a peculiar affection, characterized by the membranaceous exudation, and so distinguished from other affections of the air-passages; but this, I think, is not very satisfactorily proved, for, in the first place, I have frequently met with cases which have been styled croup, and presented all the symptoms during life, but where no membrane has been formed on the inflamed surface—the crowing respiration, remember, being equally produced if no membrane is present; and in the second place, if there should be any other exciting cause for inflammation, as a local one, a croupous membrane is liable to form, and the same is seen in diphtherite, where the disease extends into the air-passages and a croup results; moreover, occasionally in adults a plastic exudation is produced in the air-passages. I think there can be no doubt, then, that any inflammation of the larynx and trachea is called croup, whether a plastic exudation be formed or not, for such is attended with all the symptoms of that disease, and, therefore, some have divided croup into *membranous* and *catarrhal;* so alike are the symptoms and the result in both cases, that it appeared wrong to disconnect two affections exactly resembling each other, and not known to differ unless a post-mortem examination were made. If, too, croup be a peculiar form of disease, why should an analogous affection in the adult be styled by another name, as diphtheritic inflammation? My own belief is this: that children, from taking cold, are very rarely attacked with true primary pneumonia, but the air-passages are the parts most liable to inflammation—at one time the bronchi alone, and at another the larynx and trachea; and that in the latter, owing to the structure of the part, a plastic exudation is very likely to occur, but, even should it not, croup is the term which is applicable to the affection. In a case, then, of well-marked croup, you find a membrane covering the larynx and trachea, beginning often on the under surface of the epiglottis, and extending downwards to the bifurcation of the trachea. It has but slight adhesions, and may be removed wholly as a hollow tube,[1] as you see in this specimen, which, however, came from an adult. You will perceive how it is placed in real croup in these preparations[2] from children, where it is seen covering the whole surface of the windpipe; in most cases where we have an opportunity of examining the case after death, we find the exudation does not end here, but extends into the bronchi; the membranous character, however, ceases at the bifurcation, and is changed into a corpuscular or purulent secretion. In cases which recover, the bronchial tubes are but slightly, if at all, affected. The cast, when examined, is found to consist of simple fibrillated lymph holding corpuscles in it; the mucous membrane beneath is generally red from vascular injection, but often this stage has passed away, and the membrane is pale. The larynx and trachea may have a plastic exudation in common with the bronchi, and associated with a pneumonia, as presently to be mentioned; and in one such case, the most marked and urgent symptoms being connected with the windpipe, the case was considered to be one of croup, and in another case, where the whole of the air-passages were covered by a similar membrane, the cause was swallowing boiling water. In adults, it sometimes happens that a plastic mould may be formed in the windpipe; but then, as the term croup is alone applied to children, this is called a *diphtheritic inflammation*. Thus, in this larynx[3] of a girl who died from phthisis, there is a complete cast of the larynx and trachea. Also, in the new disease which is now raging, styled diphtheria, the morbid action very often extends into the air-passages, although this, being a secondary affection, is not styled croup.

Having spoken of the windpipe, we will now pass to the same affection, or *plastic exudation, in the bronchial tubes*. This, as before said, may be merely a part of a general croupous inflammation of the air-passages, but, as a rule, the membrane ends with the trachea, and then gradually passes into a softer or purulent secretion. Sometimes, however, it continues throughout; but, if so, it has been (as far as I have seen) only when pneumonia was also present, and not in cases which are ordinarily called croup. Thus, in the specimen I just now showed you of inflammation being set up by the imbibition of boiling water, the whole passages were involved; but in this case there was pneumonia, and thus, I think, we may divide this part of the subject into two,—that where it is associated with *pneumonia,* and that where it is *idiopathic.* In certain exceptional cases of pneumonia, the tubes are filled with lymph as well as the lung, as you see in these specimens;[1] the whole lung tissue is blocked up, including not only the air-cells but the tubes themselves, as here exposed. It is a question whether the lymph is formed within the air-passages, or is thrown out from the cells; the little appearance of inflammation of the tubes has led to the latter opinion, but, at the same time, it is possible for them to be formed in the parts themselves; why the bronchi should thus be affected in some cases, I do not know. When the tubes are alone affected, the disease has been called *plastic bronchitis;* this I have never met with in the dead body, but I have occasionally seen it in persons suffering from bronchial complaints, when the casts have been thrown up. These take on the form of the tubes, present an arborescent appearance, and thus are expectorated, as you see in this preparation.[2] Instead of the secretion being corpuscular and in the form of purulent mucus, it is lymph moulded into the shape of the air-passages and their minute ramifications. These casts, as well as those associated with pneumonia, may be solid or hollow; the latter being a very common condition, might suggest that they were necessarily thrown out from the adjacent membrane, but I do not think that this constitutes an absolute proof.

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[1] 1713.

[2] 1693, &c.

[3] 1696^{10}.

Results of Inflammation, and Chronic Changes.—*Pustules* are met with sometimes in smallpox. I never opened but one body having this disease, and this is the larynx[3] from it. The appearances have now much gone off, but pieces of false membrane may still be seen on the surface.

Ulceration.—It is remarkable that simple catarrhal inflammation does not pass into ulceration, and therefore you must remember

[1] 1718^{5}, ^{16}, ^{17}, and drawing 248^{40}, ^{41}. [2] 1718^{15}. [3] 1694^{35}, and drawing 246^{25}.

that this is not one of the results of bronchitis. The affection lasts for years, but without any breach of surface; and although this may occur to a slight extent at upper part of larynx, as result of various forms of inflammation, yet in trachea and bronchi I do not know that simple ulceration is an event ever witnessed. When it does occur it is associated with tuberculous phthisis in by far the majority of cases. As a rule, then, ulceration does not happen; and in most severe inflammations, when secretion or lymph is removed, the mucous surface will be found entire, and even where found abraded it has generally been in those cases arising from imbibition of an irritating fluid.

Aphthous.—This is the simplest form of ulceration, and is found associated with the same disease in the mouth. It is characterized by a few very small follicular ulcers being met with in the larynx, and is sometimes seen in phthisis.

Tuberculous disease and ulceration is met with in most cases of phthisis that have had any duration. In an early stage the tubercle may be seen scattered through the mucous membrane; after this a softening takes place, and minute ulcers formed; at a subsequent period these run together, and, fresh tuberculous matter being produced, a large ulcer results, as an uneven surface, with white points of deposit on the base. Sometimes the whole larynx and trachea may be thus affected, but generally the ulceration is in patches; and next to the larynx a favorite place is the trachea just above the bifurcation, and then not unusually the ulceration extends down into the bronchi and their branches. Its principal seat, however, is the glottis, and the neighbourhood of the vocal cords; and here sometimes disease may be found, and all other parts healthy. An ulcer may be seen at the posterior attachment of the vocal cord, at the base of the arytenoid cartilage, this being exposed, and the joint open. The ulceration then creeps along in the course of the cords until these are wholly destroyed; and in some cases the disease extends along the epiglottis, so that its edges are found eaten away; this produces the most troublesome symptom towards the finale of phthisis, and especially if it should extend still further, as is sometimes the case, into the pharynx; then you find not only the interior but the top of the larynx destroyed, and the outer or pharyngeal surface also involved.[1] Some of you may be asking whether this is the disease known as laryngeal phthisis; I suppose it is, although it is a bad name, as it perpetuates the error that tubercular disease may be located in the larynx alone, as one of the forms of phthisis; now, I never saw such a disease apart from a similar affection of the lungs themselves.

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[1] See numerous specimens.

Syphilitic Disease of the Larynx and Air Passages.—In the tuberculous disease just mentioned, apart from the small amount of adventitious scrofulous deposit, the affection is characterized by the extensive ulceration, whereas in the syphilitic form the peculiarity is the thickening and induration owing to a formation of fibrous tissue. The difficulty is in distinguishing between a syphilitic and a simple inflammatory form of disease; but I believe the majority of cases of *chronic laryngitis* which we meet with are syphilitic, and the more likely is this to be the case when there is a large amount of fibrous deposit present. The disposition, you know, in constitutional syphilis is to the production of lymph, which may subsequently become a tough fibrous tissue; this you see in periosteal nodes, as well as in the same formations in other parts; and thus in the larynx you may find sometimes, perhaps, nothing more than a mass of fibrous tissue developed in the glottis, and almost closing it, as in this specimen;[1] in other cases you find, with this extreme thickening, also the epiglottis thickened and hardened; or this condition may extend down the larynx as far as the trachea; or the whole organ may be indurated throughout, and even sometimes the cellular tissue externally with the adjacent small lymphatic glands all matted together, and implicated in the process. With this induration there is generally more or less destruction of parts, and in most cases, no doubt, the ulcerative process has accompanied the induration and contraction; and thus the inner surface has either lost its mucous membrane, or presents a cicatriform appearance; the vocal cords may be altogether destroyed, the epiglottis also partly or wholly gone, or presenting a contracted, withered appearance. Sometimes, if the ulceration is considerable, the whole of the inner surface of the larynx presents a shaggy or flocculent aspect, and occasionally the ulceration is continuous over the glottis, with an ulcer of the pharynx; in such a case the question may arise as to the original site of the disease; but, as both these parts may be independently affected, it is possible that the disease in both has progressed simultaneously. Other parts of the air-passages may be affected as well as the larynx, as you see in this specimen,[1] where the lower part of *trachea* is very much thickened, and surface ulcerated; and in the preparation I just now showed you, of contracted *bronchus* arising from an ulcer, the nature of the disease was clear, in the fact of the patient dying of syphilitic laryngitis: the contracted trachea also had the same origin. As I before mentioned, in some of these cases of ulceration of the trachea the rings are laid bare, as you will see in these specimens; and which sometimes become detached during life, if the patient recovers.

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[1] 1913^{20}.

A *cancerous ulceration*, or destruction of the upper part of glottis and epiglottis, in connection with the same disease in the pharynx, sometimes happens, as you see in these preparations, though it is not very common.

Typhoid Ulceration.—One of the concomitants of typhoid disease is an affection of the larynx. It is very rare in this country, though it sometimes occurs, and is generally described by continental physicians under the name of *laryngitis typhosa.* This larynx,[2] however, with this typhoid intestine, shows the affection which is described. At the posterior part of the larynx, at the junction of the vocal cords, you see a little hollow space on each side; this cavity was produced by the softening and sloughing of a deposit which had occurred at this spot. The remarkable circumstance in the case was, that this cavity led into a space between the trachea and œsophagus, through which air had escaped, and had given rise to general emphysema. I may here remark, that emphysema has been occasionally observed in the course of typhoid fever, and in this affection probably may lie the explanation.

Disease of the Cartilages.—I have just now stated that very many of the chronic laryngeal affections have a syphilitic origin, and wherever the induration and thickening exists of which I have spoken, there is considerable suspicion of this being the case; there appears, however, to be an affection of the laryngeal cartilages independent of the specific taint. In many instances, such as in the case from which this specimen came, there was no syphilitic history; the disease advances by considerable pain and swelling about the larynx, accompanied by suppuration either within or without. After the abscess is opened, the cartilage is seen to be dead and of a black color, and like a piece of leather; very commonly, however, the portion of diseased structure, as one ala of the thyroid, is found converted into bone, which becomes exposed and exfoliates, if death do not previously ensue. The nature of the pathological affection is not altogether clear, when the inflammation has begun on the surface. The name *perichondritis* has been given, but, as in many cases of the disease an ossification of the cartilage has occurred, it has been thought that this is the commencement of the morbid condition, and that necrosis follows, attended by suppuration and exfoliation; whilst others think, that during the slow inflammatory process, whether arising in the first place from syphilis, injury, or other cause, the change in the cartilage takes place. This affection of the cartilages is to be considered independently of the chronic laryngitis, where the mucous membrane is especially diseased, for it is accompanied by different symptoms, and runs a different course. Sometimes an abscess opens externally, and the cartilage is exposed, as you see here;[1] or the abscess may pass up and open into the pharynx, as in this specimen.[2] In this you see it is the cricoid which is especially affected, and a fistulous opening leading from it to without.[3]

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[1] 1718^{73}.

[2] 1698^{10}.

I may here refer you to several specimens, of which the pathology is very obscure, where an opening exists between the trachea and the œsophagus; in these[4] cancer was suspected, but none was found after death; and, if due to simple suppuration, its cause was not evident.

Ossification.—This sometimes occurs in various parts of the air-passages. I have already said that in cases of disease of the cartilages, attended with suppuration, it is very frequently met with. In old persons the larynx is thus found ossified, as you see in this specimen;[5] also the rings of trachea and bronchi may be ossified. And here you see[6] bony deposits forming plates and irregular patches all along the trachea and bronchi; these are quite independent of the rings, and are formed in the mucous membrane; the microscope showing true ossific structure.

Adventitious Growths.—These occur mostly at the upper part of the larynx, and are of the polypoid character. The favorite seat is near the vocal cords; the simplest and smallest of these growths are of a *warty* kind, as you see in this specimen.[7] When placed under water, you see shaggy or villous process float out, and they are then seen to be attached to the vocal cord. Sometimes a growth of this kind reaches a larger size, and nearly fills the glottis, as in this one.[1] They then constitute tumors, and are really cancers of the epithelial variety, or *epithelioma;* such a one you see here,[2] which was removed during life, by Sir. A. Cooper; and only a short time ago Mr. Cock had a similar case, but there the tumor grew from the external surface, and protruded into the pharynx. Some such tumors are of a simple fibro-cellular character, and should rather be called *polypi.* None of these circumscribed or pedunculated tumors are truly cancerous, a disease disposed to infiltrate and destroy; but this specimen[3] appears to be true *cancer,* as it is involving all the upper part of the larynx, and protrudes both externally and internally. I think a primary true cancer is rare; the disease is generally of the epithelial variety, which spreads and destroys all the superficial parts, but the disease is local. Cancer may affect the air-passages from without, and thus in cancer of the œsophagus the disease may extend to trachea, though the latter is rather destroyed by it than involved in the disease; in cases of cancer of the root of the lung, the disease often involves and penetrates the tubes, as you see in this preparation.[4]

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[1] 1684.

[2] 1684^{29}.

[3] 1686.

[4] 1714^{10}, &c.

[5] 1711^{63}.

[6] 1711^{55}.

[7] 1704.

INJURIES.—Injuries from direct violence are very rare, but those most usually seen are in cut throat. Mostly, however, the instrument of destruction passes between the cartilages, or rather above the thyroid, and so they are uninjured; if they should be incised, and union take place, it is, as I have before said, not by a reproduction of cartilage, but by fibrous tissue, which in the course of time may become bony.

FOREIGN BODIES.—This is a subject very important in surgical practice, as you may often be called in to perform tracheotomy on account of extraneous substances having found an entrance into the windpipe. You will see among our preparations, coins and pieces of bone which have thus passed in. During life the body may be found constantly moving up and down the trachea, endeavouring to make its exit, and first passing into one bronchus and then into another; when, however, it has become permanently fixed, and death has been the consequence, it has, I believe, been invariably found in the *right* bronchus, or one of its branches, where it has produced a local inflammation, abscess, and destruction of the lung tissue.

SPUTA.—This is scarcely a subject for these lectures; but let me advise you to familiarize yourselves with the different appearances

[1] 1703.
[2] 1691.
[3] 1691^{50}.
[4] 1716^{25}.

of the matters expectorated, as they are seen by the naked eye and by the microscope—such as the frothy mucus of bronchitis, especially where there is much difficulty in expectoration; the large quantities of uniform purulent matter in acute bronchitis; its nummular character in chronic disease of tubes and in phthisis, and the rusty expectoration of pneumonia; also the black spit in some forms of chronic broncho-pneumonia, or the large quantities of matter (which is often fetid) from an empyema; then the application of the microscope, which displays in all these, as a principal ingredient, granule or pus cells; the dark specks due to larger cells containing black points of pigment; the red expectoration showing blood globules, and with these epithelial cells, round nucleated pavement cells from smaller bronchial tubes or perhaps pulmonary vesicles; ciliated cylindrical epithelium from the larger tubes, and with these may be associated larger epithelial cells from the mouth. In cases of phthisis, where the lung is disorganized, portions of the tissue may sometimes be found; and it has been stated by those who have made a long study of the subject, that tuberculous matter may be recognized by the irregular form of the cells.

PLEURA.

INFLAMMATION.—Pleuritis presents various conditions, according as it is acute or chronic, and according to the kind of material effused. As I have before said, although the acute may pass into the chronic, yet, very often, the two affections are so different that they do not so much resemble each other as some diseases bearing distinct names: a fluid effusion, for example, on the one hand, and a thickened pleura, approaching almost in character to a new growth, on the other.

AN ACUTE PLEURISY, if seen a day or two after its first onset, is characterized by an effusion of lymph forming thin films over the surface of the pleura, and causing the lung to adhere to the chest. This thin layer can be easily peeled off the serous membrane, which is then seen to be of a dull hue, and at the same time highly vascular. The hyperæmic condition is best witnessed on the costal pleura, where the membrane is often intensely red; but on the lung, as it is frequently associated with pneumonia, the pleura presents a dull and whitish aspect. Even earlier conditions of inflammation are sometimes seen, where from a dull-looking pleura a very minute quantity of exudation may be scraped off; but generally much more effusion is seen than has been mentioned. Thus the whole lung may be covered with a layer of soft lymph completely hiding it, and the costal pleura covered in like manner; and in such a case the lobes would be found adherent together, and the base of the lung to the diaphragm. I cannot say in what proportion these different parts are likely to be affected, but I think inter-lobar pleurisy, and that of the base of the lung, are as frequent as any. Combined with this *effusion of lymph* there may be some *serum*, which will collect in the meshes of the fibrinous exudation, and may be found in considerable quantity in the pleural space. Local patches of pleurisy may be found over the consolidated portions of lobular pneumonia, apoplexy of the lung, &c. After a moderate amount of lymph is thrown out, some absorption takes place, and the remainder forms into a fibrous tissue which causes the lung to adhere to the chest. If you examine one of these adhesions by the microscope, you will find that it presents the appearance seen in this sketch, being composed of fibres, the surface covered with pavement epithelium, and the black specks in it consisting of pigment cells, as in the coloring matter of the lung.

Sometimes, and owing generally to a constitutional cause, the effusion becomes purulent, and an *empyema* is formed. The lymph which is thrown out forms a layer over the pleura both of chest and lung, as in the wall of an abscess, and the matter is contained within. If the chest is filled, the lung necessarily becomes compressed, and, if not adherent, contracts close to the spine. It is doubtful whether this purulent matter ever becomes absorbed, and therefore it either leads to the death of the patient, or attempts to make its way out; unless, indeed, it be in small quantity, or circumscribed, when, I think, it may remain inert for a considerable period. Not long ago I had an opportunity of examining the body of a woman who had a local collection of pus, or an abscess, at the very bottom of the chest, between the lung, diaphragm, and the ribs; this was shut in, and, I believe, had existed for some years; for during this time there had been physical signs of fluid at the part, and a history of pleurisy three years before, and I think I have met with other similar instances. If the abscess in the pleura attempt to make its way out, it is either externally through the thoracic parietes, or internally through the lungs. In the first case, it is remarkable that the favorite site for its exit is not in the spot most favorable for tapping: that is, posteriorly, at the seventh or eighth rib, where we generally insert a trocar; for nature mostly evacuates the contents anteriorly and higher up. Thus you may observe a protrusion commencing as high as third or fourth rib in front; after a time this bursts, and the pus continues to discharge for many weeks, during which time the lung may again expand, but generally the chest falls in, so that during the process of cure, considerable contraction of that side of the thorax is occurring, and this sometimes is accompanied by a slight curvature of the spine. If the matter make its way *through the lung*, it opens into a bronchial tube, is spit up, and is so got rid of; if the walls of the abscess should contract as the matter is diminished in quantity, no air need enter the chest; but generally, as the fluid escapes, some air enters, and thus decomposition takes place; the purulent matter becoming very fetid. We have, then, in the chest, fluid mixed with air; in fact, a *pleuro-pneumo-thorax*. As in such a case, however, when you percuss the body, it is possible you may not elicit the tympanitic sounds which air should give, I may explain how it differs from the more usual form of pneumo-thorax which we commonly meet with. In most cases, this affection arises from a rupture of a diseased lung, and air escaping into the chest produces, in consequence, a tympanitic sound on percussion; subsequently, too, from the pleuritic effusion which is sure to arise, a splash is heard when the body is shaken. In the case under consideration, although fluid and air may occur together in the chest, yet, from the fact of the abscess being circumscribed and surrounded by dense walls, that vibration of the ribs which is necessary to elicit a resonant note is wanting, although, if the space be large, a tympanitic sound may be produced from the deeper parts by a more violent stroke of the fingers. I mention these particulars because, as I have told you always to percuss a body before examination, you may be surprised to find a pleuro-pneumo-thorax, and yet only a dull sound elicited on slight percussion with the fingers.[1]

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[1] I may remind students who still have a difficulty in understanding this, of the explanations we sometimes give in the wards in reference to this subject: in the case, for example, of the chest producing what is called a dull sound over a large vomica; the idea generally being that a space filled with air gives on percussion a resonant note, and one filled with solid, a dull one; but it is scarcely understood that the resonance implies a vibratile condition of the ribs, and dullness a want of this; both of which are affected

You will see by the table that *pneumo-thorax* is placed a little further down, but, as I am on the subject, I will complete it. Air in the chest arises either from its exit from lung or its entrance through thoracic parietes. It is remarkable, however, how rarely the affection occurs from *injury to the walls of chest,* the opening being closed by elasticity of skin or adhesions of lungs; and thus you may remember, in the case of the police-officer who was shot through the chest, no air got into it at first; and it was only as the wound sloughed, and in the course of some days, that this occurred. In most cases, pneumo-thorax arises from escape of air from the *lung* into the chest, either from *disease* or *injury;* if the latter case, it is mostly from fracture of the ribs, and this is often associated with emphysema, or diffusion of air into the cellular tissue of the skin. When the chest is opened, the lung is found contracted, and no fluid, if death has been rapid, except some blood from the lacerated lung; if death be not immediate, then some inflammatory effusions are present as well as air. Fracture of the ribs is not necessary for laceration of the lung; for, in the case of a child run over by a cart, the lung was torn, without any injury to the parietes; and another remarkable circumstance in connection with injury of the chest is, where, after a penetrating wound, instead of pneumo-thorax taking place, the lung protrudes, constituting a hernia of the lung. I believe I have seen two cases of pneumo-thorax arise from tracheotomy, and I mention the circumstance because I am not aware that it has ever been alluded to: in one case where, after tracheotomy, death occurred without sufficient reason, both the lungs were found contracted in the chest, and the cellular tissue in the posterior mediastinum was filled with air, producing large bubbles, which, I think, had burst through the pleura into the chest. In another case, where most extensive superficial emphysema followed the operation, the breathing became laborious before death, and the lungs were found contracted in the same manner; the emphysema having penetrated the mediastina. Most cases of pneumo-thorax we meet with, arise from *disease,* especially phthisis; and this, being one cause of sudden death, may have come on after the last visit to your patient; you should, therefore, always percuss the body before opening, and, if suspecting it, you may first put a trocar into the chest, when a gush

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by what is beneath, and therefore the vibration and consequent resonance is effectually prevented by the thickened pleura lining the thoracic walls, and forming the circumference of the vomica. A strong stroke, however, might produce a tympanitic sound.

of air escapes, which is audible, or will blow out the flame of a lamp placed near the opening. Most frequently, being not immediately fatal, a pleuritic effusion has occurred, and the case is one rather of pleuro-pneumo-thorax, and thus, when the chest is opened, the lung will be found compressed, but not into a very small space, from being diseased; the remainder of the chest, as the outer and lower part, will be found partly full of purulent fluid; if you now place a tube in the trachea, and blow by the mouth, or by means of our bellows apparatus, you will detect the opening in the lung by the bubbles of air rising through the fluid; or, should the opening be above the level of the fluid, the air may be seen escaping; if not, the remainder of the chest may be filled with water, and the experiment be again made. On examining the lung, the opening will be found to be caused generally by the bursting of a small phthisical abscess, and, this already communicating with a bronchial tube by a previous ulcerative process, the direct passage will be readily found between the main bronchus and the opening. The latter will generally be met with about the middle of the lung; and in the majority of the cases which I have examined, it has been at the lower edge of the upper lobe; in one case, it was at the lower surface of upper lobe. In speaking of the first form of this disease, where the primary affection is an empyema which makes its way into the lung, the cases are not sufficiently common on the post-mortem table to warrant a positive opinion as to how the opening of communication is formed, and what is its favorite site. In the phthisical form, the opening, remember, precedes effusion. As the empyema may be circumscribed, I apprehend it chooses the nearest spot of lung through which to penetrate; but in the last fatal case I examined, after a most rigid examination, I failed to find any perforation, excepting, indeed, a number of small openings which were seen after removal of the lymph in the softened lung tissue. Such a case may, perhaps, warrant an opinion which is, I think, held by Dr. Barlow, that the matter may be taken up by the surface of the lung, and discharged by the bronchial tubes, without any direct opening.[1]

Chronic Pleuritis.—This may be essentially chronic, or result from an acute attack, and may be attended with various results, as effusion of fluid, serum, or pus, or a mere thickening of the serous membrane. So difficult is it to say in some cases where acute inflammation ends and chronic begins, that I have spoken of

[1] 1766^{25}. Pneumo-thorax. See also empyema, and numerous specimens showing pleurisy.

empyema already, or the case where pus is poured out under acute affections, but very often it is essentially chronic. So, also, with effusions of serum; in some forms of pleurisy a very rapid pouring out of fluid takes place, not so quickly, indeed, as the more solid products of lymph, which occur in a few days, but generally in the course of about two or three weeks, when the chest may be found having some lymph lining it, but at the same time filled with a serous fluid. In cases where the exudation is wholly serous, the disease is essentially chronic, and is so slow in its progress that its presence would be unknown were it not for the physical signs. In these cases the chest is filled with pure serum, and the lung is compressed against the spine; generally the fluid is again absorbed, but if by chance an opportunity for examination should occur, the pleura presents no difference from a healthy membrane, and thus this *chronic pleuritic effusion* is like other serous exudations whose pathology is unknown, as, for example, hydrocele; we know, indeed, that the serous membrane is not in a healthy state, or the increase of secretion would not take place, but the deviation from the normal condition is not appreciable to the eye.

As a chronic inflammation may result in effusion, so it may produce a mere *thickening of the pleura.* In one case this may have been preceded by an acute attack, and in another the increase of thickness is so slow in its progress, that the change is more like a growth than a product of inflammation. In the former, the process from beginning to end may be understood on carefully examining the chest; thus, if death occur some weeks or months after the first attack, you may find that the lung separates with tolerable ease from the thorax, the lymph on the surface being still soft; but on making a transverse section through the lung, the layer below will be seen more dense, and the new tissue below that, still more so, until we arrive at that next the lung, which is the hardest of all, and incorporated with the pleura. The earlier layers are thus seen to be the hardest, and the recent ones the softest; this I call a *chronic* process: not one synonymous with *old*, or one that is altogether past, but one which commenced at some antecedent period, and continued up to the time of examination. Another chronic process, but still slower, is where there is no evidence that at any time a soft material has been effused, the increase of thickness being imperceptible, and more allied to a growth: it is a question with some, whether such a thickening *must* not have been preceded by a softer effusion of lymph; but from the observation of several cases where there has been no history of any acute action having taken place, I am quite of the opinion that this is not necessary, and that such thickened pleura need never have presented any other appearance as regards its texture, than that actually found at the termination of the case. In these instances you see the lung closely adherent to the chest, by tough tissue as hard as cartilage, so that the knife is required to cut it out; in one man, I remember, this new tissue was an inch in thickness, and was associated, as is usually the case in these severe forms, with cirrhosis of the lung: the whole organ being sometimes thus affected, at other times merely a part, and the more frequent place the upper lobe. The question here alluded to, of the mode of formation of such a tissue, is one still open and discussed by pathologists; the point being whether a preliminary stage of effused lymph is necessary for its production, or whether the process is not rather allied to a slow growth; that is, whether an exudation, which is at first separate, subsequently becomes organized and attached to the original surface; or whether the new tissue has ever been separate from the latter, but has not rather been an offshoot from it. I think, myself, that both occur, and that one does not preclude the other; it is true, no doubt, that an effused lymph may subsequently become organized and form a part of the original tissue from which it proceeded, but I think, at the same time, that the other is none the less true—that is, that the increase to the surface is so slow and to so slight an extent, that no actual separation from the original membrane could ever have been witnessed; it may commence, however, in the form of elementary cells, as in a positive exudation, for even in well-formed new growths of a fibrous character, which go by the name of tumors, the nucleated fibres are preceded in most cases by a production of such cells.

ADVENTITIOUS GROWTHS.—I have already said, that in cases of cirrhosis of the lung, where the pleura is excessively thickened and indurated, the process is allied to a growth. Sometimes, in such cases, an earthy deposit takes place, or an ossification, as it is called, in the new tissue, and a large *plate of bone* the size of the hand may be found on the surface of the lung, or in some cases at the base of the lung, where the latter adheres to the diaphragm. Such large bony pieces you may see in these specimens.[1] You will hear such plates called ossifications, as also the thickening of the pleura styled cartilaginous; but you must remember that all that is meant by such expressions as cartilage-like, and bone-like, is, that in the one case the tissue is simply fibrous, and in the other, consisting of a matrix of simple fibre containing earthy matter, or salts of lime contained in the meshes of the inflammatory product.

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[1] 1777, &c.

Bone and *cartilage* may, however, occur in the lung, and therefore, on the pleura, but if so, generally as secondary deposits to similar growths in the external parts of the body, and very rarely as primary; so rarely, that in the one or two cases where I have seen them, it is a question whether, if the whole body had not been carefully examined, some similar growths might not have been found elsewhere. In a case not long ago examined, I found small bony plates on the pulmonary pleura, and these, when viewed by the microscope, were found to be composed of true osseous tissue. This tumor,[1] found in pleural cavity, is said to be fibro-cartilage, but I have not examined it.

Cancer.—When cancer involves the lung it may also attack the pleura, and it generally occurs as a secondary deposit; in these cases it is scattered all over the pleura, and sometimes without the lung itself being involved. It is generally seen in the form of white flat and smooth patches, scattered all over the pulmonary surface, but penetrating occasionally into the lung tissue. These are generally very hard, being composed of fibrous structure as well as of cells, and if only in small quantity, not easily recognized, or the idea of cancer not suggested, unless this is seen also to prevail in the abdomen, or elsewhere. The costal pleura may be similarly affected, and sometimes severely, by large vascular medullary growths springing from its surface, or occasionally by cancer actually growing through the thoracic walls, from the exterior, as in carcinoma of the breast.

Tubercle.—In cases of general tuberculous infiltration of the lungs, the pleura is frequently similarly affected, and thus the whole surface may be found covered with small miliary tubercles. There is also another form of more acute deposition, which might also be called scrofulous pleuritis, where in the case of an inflammation in a scrofulous individual, an effusion takes place in a subacute degree, but of a tuberculous character. Such an instance you all had an opportunity of seeing, only lately, in a boy, who, after receiving a

[1] 1769^{64}.

blow on the chest, had a pleurisy set up; and at time of death, three or four weeks afterwards, the lung, when torn from the thorax, was found to have a yellow scrofulous matter effused upon it, or a lymph putting on the tuberculous character.

Amongst the MORBID CONTENTS of the CHEST, I have mentioned *air*, *serum*, and *blood*, and these have already been alluded to under several heads. I have said *air* may get in from without through the chest, in case of an opening in the parietes, but more usually it arises from the lung, and this occurs either from injury or disease; in the first place, mostly from a fractured rib lacerating the organ, or its being punctured by the stab of a weapon, or bullet. It is remarkable that the latter does not always cause pneumothorax, even if the organ be considerably injured. If from disease, it is generally from rupture of lung occurring in phthisis. Dr. Hughes relates a case where he thinks air escaped from an emphysematous bubble; but, recovery taking place, there was no opportunity of verifying the diagnosis.

Serum.—I have already alluded to this as one of the products of inflammation, but it may also be a passive effusion. It is thus found associated with dropsy in other parts of the body, in connection with heart or kidney disease. It is often difficult, however, to know why it should occur on one side rather than the other; but in Bright's *Disease of the Kidney*, you may often find a very simple explanation in the fact of one lung being adherent, and, there being no space for the effusion, the lung itself being œdematous, while the effusion occurs on the other side where there are no adhesions, and the lung is consequently compressed. If it be true, according to the statement I have already alluded to, that the left bronchus is compressed by the left auricle in some forms of heart disease, it is easy to conceive how the pulmonary vessels would also be constricted, and thus effusion might rather be determined on the left side. I mention this, as it is a point yet to be worked out. It may arise altogether from a local cause, as when pressure occurs on the pulmonary vessels, as in cancer of the bronchial glands, and thus is a very common termination to cases of carcinoma mammæ. This passive effusion is called *hydro-thorax*.

Blood.—Blood in the pleural cavity may have many sources; thus, a rupture of aneurism may cause it, or a wound of the lung from fractured ribs. In such a case, a short time ago, where death occurred after some days from pleurisy, lymph was found mixed with blood, forming a layer on the surface. It may also occasionally arise, as I have a few times seen, from laceration of the liver, the lower ribs being fractured. The diaphragm and liver have been torn, and blood has been effused into the chest. This, of course, is when the right side is injured; a similar injury on the left side, with laceration of diaphragm, would tend to diaphragmatic hernia, or displacement of the stomach into the chest. In all such cases the source of blood is manifest; but there is one case where students are often considerably puzzled, and that is, where blood is mixed with inflammatory exudation, as in *hæmorrhagic effusion.* I have already alluded to a similar state in the pericardium: it arises probably from some constitutional cause, where there is a tendency to purpura, and thus, after the pleurisy has existed for some days, blood is poured out. On opening the chest, the lungs seem compressed, and the cavity filled apparently with blood; but on careful examination the serous membrane will be seen to be covered with lymph, and in its meshes blood is effused. Whether the source of this is the original tissue softened by the inflammation, or the rupture of new-formed vessels, has not yet been satisfactorily determined.

Contents of the stomach may sometimes be found in the chest, and I tell you of it because it may puzzle you if met with; it is not common, but I have seen it two or three times. You know that the stomach becomes dissolved sometimes by its own juice, and the contents escape into the abdomen; in the same way, from the body lying on its back, some of the gastric juice passes into the œsophagus, and, there causing a similar solution, the contents may escape into the chest, and then, indeed, begin to act on the lung, softening and dissolving its structure. It is very important sometimes to recognize such post-mortem changes, and distinguish them from ulcerations; for I remember it was in a case of poisoning by arsenic, that I saw one of these cases of digestive solution of the œsophagus.

I have already alluded to the case of diaphragmatic hernia, where the stomach, or transverse colon, may pass through a ruptured diaphragm, into the chest.

LUNGS.

HYPERTROPHY.—We know very little of hypertrophy of the parenchymatous organs, as I shall presently have to say with reference to the abdominal viscera: that is, in an absolute sense, although a relative hypertrophy is common enough, the wasting of one part (or one organ, when it is double) being compensated for by the enlargement of another; and thus, as regards the lungs, when one of them has been long atrophied the other becomes larger, and thus it is seen not only filling its own side, but crossing the median line and heart and reaching to the opposite side. I cannot, however, in such a case as this, positively say that the lung is actually hypertrophied, although enlarged; but, judging from the analogous case of the kidney, I see no objection against its being so.

ATROPHY arises from various causes. The most simple case is where the lung has been long compressed from pleuritic effusion or thickening, when the tissue has eventually undergone a structural change,—in fact, become atrophied. The same may occur in a part of the lung, as presently to be mentioned, or a lobe may be so affected by chronic pneumonia as to waste away.[1]

CONDENSATION OF THE LUNG—ATELECTASIS, APNEUMATOSIS, &c.—This is the condition of a lung while in the fœtal state, or while in utero, and which has never yet contained air. The cells are collapsed, and thus it constitutes a solid mass, which sinks in water, like any other organ. After the lung has been used, if the air be squeezed out the same state is again produced; this is well seen in pleuritic effusion, where the lung becomes compressed against the spine, and when taken out is quite airless, and sinks in water; this is at once distinguished from a hepatized lung, which also sinks in water, by being tough and resembling a fleshy substance; hence the name *carnification*. The air in this case is forced out by external pressure, but the same thing may occur in parts of the lung from mere want of power in the respiratory process to overcome the natural elasticity of the tissue, and, consequently, certain lobules, or larger portions of the lung, may return to the fœtal state, and, inasmuch as this resembles the same condition where, from debility of the child, the lung has never been thoroughly filled, the name *atelectasis*, signifying *imperfect expansion*, has been given to it.

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[1] See drawing of lung so compressed by pleurisy.

In infants who survive their birth but a few days, the lungs may be thus found imperfectly expanded, portions being quite airless, dense, and sinking in water. At a later period of life, the same state may still be found, and then it is very probable that the lung may have once been wholly expanded, but, owing to some weakness of the patient, portions have again resumed their original fœtal condition. If, indeed, this does not occur from mere inability of inflation, it has of late been very satisfactorily proved to arise from any cause which may obstruct the entrance of air into the lung. I believe the first person who directed attention to this return to the fœtal state in certain portions of the lung was Dr. Alderson, who, several years ago, in a paper in the *Medico-Chirurgical Transactions*, relates how this condition is often found in conjunction with hooping-cough, and that it had hitherto been looked upon as lobular pneumonia. The same result, however, may follow ordinary bronchitis, and the condition of the lung produced is peculiar, and I have now seen several examples of it. The lung, which in a child is of a light color, is seen to have a number of dark red portions on its surface and within; these were formerly supposed to be hepatized parts; they are more solid than the healthy tissue, and often sink when placed in water, but, unlike a hepatized lung, the surface is not granular when a section is made, and, moreover, these parts are depressed below the surface, whereas a mass of inflamed lobules would be raised. This is, of course, what you might expect, when in the one case the cells are filled with an albuminous matter, and in the other they are simply collapsed or airless; they are both increased in specific gravity, but one is enlarged, granular, soft, and exudes a fluid on pressure, while the other is diminished, smooth, tough, and dry. The proof we have of this being its true condition is in the power we have of artificially inflating these portions, and thus reducing the lung to its original state. I should say, however, judging from my own experience, that the two conditions may be combined: that is, an inflammatory exudation occurring in the collapsed part, whether one as a consequence of the other, or the two occurring together, I cannot say. It is a state especially met with in children, but probably in old people, particularly in the bronchitic, a collapse of a large portion of the lung may occur, especially at the posterior part, and accompanied by recent inflammatory effusion; thus, portions of the organ are soft, easily broken down, and exuding serum, while others appear airless, but are firm and dry. A more than usual interest is attached to this subject, since it has been made the foundation for a new theory of emphysema, as I shall presently mention.

EMPHYSEMA is divided into two forms, the *vesicular* and the *interstitial*. The first is the most common, and that which is generally implied when the term emphysema is used, although it so happens that it is in this very case where the term is not strictly applicable, for, as used elsewhere, it means an infiltration of air into the tissue, and which, in the case of the lung, occurs only in the second form.

Interstitial emphysema, I say, is the only true form, though the more rare, and is due to the escape of air beneath the pleura and into the tissue. It is generally recognizable by a number of air-bubbles beneath the pulmonic serous membrane, as it were a number of beads scattered on the surface. I believe it is mostly found in the lungs of children who have long been subject to bronchial affection, and here is such a specimen, which has not yet been put up. The surface of the lobe you will see covered by a number of air-bubbles.

The *vesicular*, or *ordinary emphysema*, is an affection which has of late attracted much attention, from the novel theories respecting its mode of formation, and, therefore, I will venture upon a few particulars concerning it. Emphysema, when existing to any extent, is at once recognized, and I am constantly showing it you in old bronchitic cases, and a specimen of it you see here.[1] The lung appears to have a number of additional pieces or bladders attached to its surface, and some of them are pedunculated. They are seldom seen except along the front edge of the lung. When cut through, you perceive they are composed of a highly rarified tissue, like sponge, consisting of large cells or spaces, which are either immensely dilated pulmonary vesicles, or several of these which have run together from the rupture of their partitions. It is mostly in old cases of bronchitis that you will meet with this condition, but not uncommonly, also, in chronic phthisis. The connection of emphysema and these diseases has always been recognized, and as consequent upon them. Bronchitis is evidently a very usual cause, and thus Laennec, who was almost the first to study diseases of the lungs by a philosophic method, framed an explanation which has generally been received up to the present day. He thought a bronchial tube became obstructed by mucus, and, consequently, the air in the pulmonary tissue leading from it could not escape during the expiratory process, and therefore, from the great compressing force upon this part of the lung, the air distended the vesicles or burst through the tissue. Although such a process could not be absolutely proved, and there were many difficulties in the way of explanation, yet the evident connection of emphysema with bronchitis, and the many reasons to believe that it occurred during violent fits of coughing—that is, in the expiratory process—caused most physicians to follow Laennec, and, consequently, his doctrines have been taught in this theatre up to the present time, and in spite even of the promulgation of the more recent theories. The latter theories have resulted from the discoveries made with respect to collapse of the lung, or atelectasis, as I just now explained, and for their full development we are mainly indebted to Dr. Gairdner. It is said, in the first place, in opposition to Laennec, that any obstruction of a bronchial tube could not cause the retention of air behind it, but rather the opposite condition, for any plug of mucus in a conical tube would act as a valve, and thus, although not admitting air, it would easily allow the egress of that already in the vesicles; and to prove this, experiments have been instituted on the lower animals, in which bullets were placed in the bronchial tubes, when the tissue to which these led, so far from becoming expanded with air, became collapsed; the ball, acting as a valve, allowing air to escape, but not to enter. This immediately refuted Laennec's theory, for, so far from emphysema being produced, the lung contracted and became dense, in the manner already mentioned. Another objection, too, given is, that a pressure on a part of the lung during the expiratory process could not cause it to dilate, for equable pressure on a membrane full of air, however delicate, cannot alter its form; again, if the disease were produced after Laennec's idea, those parts of the lung should be found emphysematous where the tubes are most liable to obstruction; but the opposite is the case, the one occurring at the anterior parts, and the other at the posterior. With these objections, Dr. Gairdner has expressed his opinion that emphysema occurs not during expiration, but during inspiration; and that, although the first step in the process is, in most cases, a bronchitis, this is only effectual in producing a collapse of a portion of the lung, which is the condition immediately antecedent to the dilatation of another part of the tissue; the latter, indeed, being compensatory to the previous contraction. He thinks a tube, and this is generally one leading to posterior part of lung, becomes obstructed; that the portion of lung to which it leads, collapses; and that, consequently, during inspiration other portions, generally the anterior, become distended, to compensate for the proportional decrease: that the chest, indeed, when it expands, must be filled by a certain bulk of lung, and that, consequently, when one part of the tissue has become contracted, another distends. Dr. Gairdner does not say, as some have misunderstood him, that when a part of the lung is functionally obstructed, as in pneumonia, another part expands to make up for its loss, but simply that, when one part is contracted, another expands to supplement its bulk in the chest; again, if the tissue of the lung should contract from any other cause except bronchitis, emphysema would occur, and thus its existence in very chronic cases of phthisis, where portions of the tissue are found puckered up by tubercular or inflammatory deposit. This theory had already been received by many, although, as I before said, several of our older and most experienced physicians still held by Laennec; and, as I have heard, many of my senior colleagues declare that, although there might still be difficulties in the old views, yet they could not but think that emphysema occurred during expiration. Quite lately, Dr. Jenner has supported this view, as opposed to Gairdner's, and believes that it is during the expiratory process that the disease really occurs. He does not believe, with Laennec, that it is due to a compression of the air behind an obstructed bronchial tube, for the objections already stated are, no doubt, opposed to this; but he considers Gairdner's simile of equable pressure on a bladder of air not true of the lungs, for the pressure of the chest is not equal; thus, the posterior part of the chest, with the side and floor, exerts an equal and uniform pressure on the lungs; but the anterior part of these organs, towards the mediastinum, and the apices beneath the clavicles, have not the same force upon them, and thus, if the whole lung were more than usually pressed by the thorax, these portions would endeavour to protrude and become distended; thus, the expiratory force is quite equal to the production of emphysema in these parts, where the pressure is less, and in cases of violent cough, the apex of the lung may be actually seen forced up above the clavicle; moreover, this condition may occur without any appearance of compensatory contraction in any other part. And if the example of draught animals be taken, we find emphysema occurring merely from the strain upon the lung, and without any previous bronchitis or disease of the tissues; the strain being during the expiratory process, when the chest is expanded and glottis closed, so as to make a purchase for the muscles. These views of Dr. Jenner appear to carry weight with them; but, always fearing lest an erroneous opinion should be given too hastily, I have preferred laying these various views before you, rather than give a dogmatic opinion in a more decided manner.

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[1] 1723, &c.

HYPERÆMIA AND CONGESTION.—A congestion of the lung is constantly met with in cases where the blood is delayed in its passage; it is seen often in perfection in cases of paralysis of the chest where the spine is fractured, the lungs being exceedingly gorged, and sometimes to such an extent that the blood oozes through the bronchial membrane, and in the tissue itself small extravasated spots may be met with. In very many cases of bodies you examine you will find the posterior part of the lung much gorged with blood, and of a dark color; this is due to the prone position of the patient some time before death, and probably to the commencing softening of the tissues: this is known as *hypostasis*, and passes into an inflammatory state, presently to be mentioned.

A spotted condition of the lung, even if due to extravasation, does not necessarily show a mechanical impediment, for it may be due to a diseased condition of the blood or the tissues, and be of a *purpuric* character; thus in true purpura the lung as well as other parts of the body will be found spotted on the surface and in the internal structure, and seen also in many other organic diseases, where the same tendency exists, as well as in cases of manifest blood poisoning, as pyæmia, &c.

A very long-continued congestion, as is seen in heart disease, gives rise to a very peculiar condition, which is much in want of a good name to characterize it, for it is not mentioned by some authors, and by others classed with pneumonia. I believe the name *splenization* was first given to this condition, although since applied to a stage of inflammation; as, however, I have always used the term in connection with the cardiac lung, I shall continue to do so. I have already mentioned, that as a consequence of the long-continued congestion in heart disease, various necessary changes occur on the serous and mucous surfaces; and in the parenchymatous organs a remarkable hardening, noticeable especially in the kidneys and spleen: in like manner the lungs are indurated, the organ feels bulky and heavy on removal, suggesting a hepatized tissue, but, on section and more careful examination, the structure is found dense and tough, and containing but little air, which you see in this wet specimen. In parts of it, blood may be found actually extravasated, constituting apoplexy; but, without this, you may sometimes find a whole lobe solid, almost airless, and at the same time quite tough when an attempt is made to tear it. There are various degrees of this: when slight, the lung is red, and resembles a hardened spleen, and in this case a microscopic examination shows little but stagnation of blood in some of the smaller vessels. In more extreme cases this redness is lost, and the lung assumes a browner shade; and when in this condition the microscope shows abundance of corpuscles and granule masses, and a chronic inflammatory state is no doubt present.

Sometimes, in persons who have been suffering with disease of the brain, which interferes with the respiratory process, the lung may be found remarkably tough.

Apoplexy.—If the pressure on the bloodvessels be very great, the blood is actually effused into the tissue, and we have what is called *apoplexy* of the lung—a most absurd name, but one now in general employment. The blood gradually oozes out, and infiltrates itself into the tissue, both into and between the cells, and there coagulates and hardens; so that it does not necessarily happen that any of the fluid escapes into the bronchial tubes, or that there should be any hæmoptysis during life. Owing to this gradual exuding and coagulation of blood, the part thus affected becomes quite hardened, and the circumference is quite defined from the adjacent healthy tissue. The apoplectic condition is thus recognized on the surface of the lung before it is cut into; the part is enlarged, as it would be if hepatized, but instead of passing off gradually into the adjacent tissue, it is defined by a distinct boundary, and thus it is felt like a tumor in the lung. A section at once shows its nature, and distinguishes it from hepatization; it is seen to be blood, and of a black color, and resembles (to use the common simile) damson cheese, the texture of the lung being scarcely discernible.[1] There are, however, cases where inflammatory products have been poured out, and thus a hepatized and apoplectic condition may be often combined; the section of an indurated lobe being white and granular in parts, and having small masses of blood in others; moreover, on the pleural surface it is not unusual to find a thin layer of lymph, showing the inflammatory process which has been present. Besides this, however, you may often find white fibrinous masses in the lung, indicating older effusions, the hæmatine having decomposed and become absorbed, leaving the more solid part of the blood as a white mass; and as this contracts, so does often the lung tissue with it; and thus is produced a puckered condition of its edges, with sufficient traces of the apoplectic state about it to show its pathology. In old cases of mitral disease, these various changes in the apoplectic masses may be seen, but not often the puckered state showing complete absorption, which probably is to be referred to some previous temporary attack of obstruction in the circulation. The favorite seat for apoplexy is the circumference of the lung, and especially the lower edges, and more particularly, I think, those of upper lobes. I believe it is stated that the right lung is more usually affected than the left; but I cannot say that I have positively proved this, although I think it to be true.

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[1] 1725^{24}, ^{38}.

It is remarkable that this apoplectic condition does not follow the congestion of bronchitis, but only that of heart disease; this is due probably to the seat of stagnation being different in the two cases: in the one, owing to the non-aeration of the venous blood, it can with difficulty pass through the capillaries; while in the other case the blood passes through, but is detained in the capillaries and smaller pulmonary veins, whence it escapes into the tissue; the blood therefore, in apoplexy of the lungs, would be from the pulmonary veins rather than the arteries.

There is also another condition, which is sometimes called apoplexy, arising from a different cause, and producing a *spotted* condition of the lung, whereas that just described forms *circumscribed* masses. It arises from the entrance of blood into the air-passages, and its diffusion into the cells. The fluid passing down a tube, and entering one branch rather than another, small portions or lobules of the lung become infiltrated, producing this spotted appearance. It is met with in those who have died from hæmoptysis, and especially in those where the lung has been seriously injured by a fractured rib, leading to death by the drawing of blood into the tissue.

ŒDEMA OF THE LUNG.—This is a condition very frequently found in Bright's disease, or where there is a disposition to dropsy; the lung is found filling the chest and heavy, and on a section being made, a quantity of serum drains out, leaving the tissue healthy and firm. It is thus distinguished from the first stage of inflammation, in which the texture is very lacerable. Sometimes, however, when a person has been long dying, the texture may soften, and then if, as in renal disease, we know the lung is equally inclined to be œdematous or to be inflamed, it is difficult to say whether the serous infiltration be active or passive: this difficulty has given rise to the term *inflammatory œdema.*

INFLAMMATION, OR PNEUMONIA.—It was long taught, and is still, I believe, by some, that inflammation of the lungs consists in the exudation of lymph into the interstitial substance, or parenchyma of the organ; but of late years a different explanation has been adopted, although one always taught in this theatre by Dr. Addison, who, I believe, was the first to show the true nature of the process; the new theory being that the inflammatory product is poured into the air-vesicles themselves. He was led to this by actual observation of the seat of the exudation, by the structure of the pulmonary cells, and by the absence of any distinct intercellular space in which the lymph could be effused; there can be no doubt, however, that the wall of the vesicle is involved in the inflammatory process. The subject of the various changes in the lungs in pneumonia is one of great interest, and might be prolonged to almost any extent; but I must be content with giving you a general outline of it. These changes are not peculiar to the lungs, but resemble very much what occur in other organs; in the first place, there is a hyperæmic condition, or vascular engorgement; this, however, is rarely seen, as the disease is not fatal at this stage. Soon an exudation takes place from the vessels, as in other tissues, and in this condition we often find the lung. On taking the inflamed organ out of the chest, we find it more bulky and heavier than natural; and when cut through, a quantity of *serum* escapes, and, as the cells still contain air, this is frothy when the organ is squeezed; if now the finger be forced into it, the tissue is found to tear, being much more lacerable than in health; and this distinguishes pneumonia from the simple œdema, of which I was just now speaking. This *softening* is one of the best signs of inflammation, and shows that the tissue itself forming the walls of the pulmonary vesicles is involved; and thus, although we give up the old theory of an interstitial inflammation, yet we must not say, on the other hand, that the lymph is simply poured into the vesicles, for in all cases the membrane is involved, and the serous exudation takes place into the fibrous structure of the walls; just as happens in the peritoneum and other serous membranes, which are infiltrated and softened, as well as having an exudation from the surface. Subsequently, as in the course of inflammatory effusion in other parts, the lymph becomes more solid, so the same occurs in the lungs, and the serum makes way for a more solid lymph; so that, at a later or second stage to that of which I have been speaking, on squeezing the cut surface, a soft material oozes out instead of a fluid one, and at a still later period the air-cells are entirely filled by this substance; at the same time the blood stagnates, or, as the microscope shows, actually coagulates in some of the bloodvessels, so that the lung is now solidified, and is of a red color, and in a state of *red hepatization*, called so from its resemblance to liver. The cut surface is dull red, slightly granular, which is due to the infiltration of the vesicular structure, and no longer on gentle pressure emits either fluid or air, and is very lacerable if the finger be pressed into it. The third stage, as it is generally called, is *grey hepatization;* the lymph is now quite solid, and entirely fills the air-cells, the intervening vascular tissue has lost its blood, and become anæmic; so that the whole structure has now a white appearance, or rather grey, owing to the presence of the natural pigment in the pulmonary tissue. It is easy for you to understand this condition of lung, by supposing the air-cells, and probably minute bronchial twigs, to be filled with a solid albuminous matter; and, in fact, you may exactly imitate it, by taking a lung and injecting it by the bronchial tubes with tallow, when the whole tissue will be solidified, and presenting this appearance of grey hepatization.[1] The lung is still soft and lacerable, and the other general characters you can well anticipate, from supposing a spongy organ like the lung to have its air-vesicles occupied by a soft solid albuminous material. In the first place, instead of finding it collapsed in the chest, which is the normal condition after death, owing to the elasticity of the tissue, you find it occupying entirely its side of the thorax; and if the whole organ be involved, it has formed a mould of the chest, the impressions of the ribs being seen on its surface; and at the same time it is very heavy, and sinks in water. The great amount of solid material added to a lung within the space of seven days may be judged of by an example we had the other day, where the difference in weight between the hepatized and the healthy organ amounted to four pounds. All these physical characters are more perfect in the completely hepatized lung, but also exist in the previous stages, except in the early stage of inflammation, when, if any air remains in the tissue, it will not sink in water. The older the person, the darker the hepatized lung, owing to the increased pigment by age; while in children it may be almost white, and exactly resembling the artificially injected lung before mentioned. Although a pneumonia and pleurisy are distinct diseases, and may occur separately, especially the latter without the former, yet pneumonia is not common without some pleurisy; indeed, I think it impossible that a whole lobe and surface of lung could be inflamed without affecting the membrane which covers it; and thus, in those cases where there is no free exudation in the chest, the pulmonary pleura is seen to be dull and whitish-looking, and not uncommonly has a delicate layer of lymph upon it.[1]

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[1] 1727^{16}, ^{33}.

A *retrograde process* now takes place by a softening of the inflammatory product, and this may occur either if the patient recover or die; if the latter, the softened matter resembles pus, and is called *purulent infiltration*. In neither case is it probable that the disease has advanced to the extreme stage of grey hepatization, but stops short of this, and then undergoes a retrograde stage towards recovery, or a change of the inflammatory products into pus, leading to a fatal issue. It is not often that the first is met with, since, if once begun, the patient gets quite well; but I think I have met with it in one case, where some portions of the lung were grey, though soft, and others filled with a dirty colored fluid; hepatization was not complete, and yet it was a stage prior to complete consolidation, judging from the appearances of the organ as well as the history of the case; and I believe it to have been a hepatized lung, having its albuminous product again softening and tending towards recovery. Generally, however, when this dirty colored purulent matter oozes from the lung, it shows, not a state of retrogression, but a fatal stage of the complaint, in which the character of the exudation has altered, the inflammatory cells being changed for pus-cells, and the whole tissue resembling a sponge soaked in a greenish thin pus. You must remember, that in speaking of suppuration we do not mean abscess, for this is not the result of inflammation of the lung, except in tubercular disease, and the lobular form of pneu-

[1] 1729^{10}.

monia, termed phlebitic; it is easy, however, to make the appearance of abscess in the lung in purulent infiltration, by breaking down the tissue with the finger, when the fluid pours into the hole that is formed, and the resemblance to an abscess is produced.

I have spoken of a whole lung being affected by hepatization, but one lobe only may be diseased, or a part of both lungs, and numerous statistics have been made to show which lung and which part of it is most frequently affected; but I receive these with great hesitation, from the fact that the cases are not discriminated, some authors making their observations on the dead, others on the living, and others even combining the two. Now, I am convinced that the two classes of cases should not be placed together, as they are totally different; for you know how common it is to find pneumonia in the dead body as a sequel of many organic diseases, and that the pneumonia of the dying may, in some instances, pass into decided inflammation, and in these cases it is generally the lower and posterior parts of the lungs which are affected; and even in fatal idiopathic pneumonia, the disease must be very extensive in order to kill; but when the statistics are taken from the living, from instances of recovery, it will be found as you will soon discover in the wards, that pneumonia of the upper lobe is very frequent. I mention these doubts which I have in my own mind respecting these tables, for the question is constantly put by students as to the most frequent site of pneumonia; I connot now recall whence my information, but I know the result of statistics has been to show that the right lung is more often inflamed than the left, and the lower lobe than the upper. I am reminded by this circumstance, that I one day asked Dr. Lever which ovary was most usually diseased, and he stated that the right one was; and added, that he was quite sure the right side of the body was more susceptible to disease than the left: about this, however, I cannot venture an opinion.

Besides a whole lobe being inflamed, which is sometimes styled lobar pneumonia, we may have lesser portions constituting lobular and vesicular pneumonia. I think I may say, as a rule, that the smaller the amount of tissue which is involved, the longer has been the duration of the inflammation, and the more dependent on a constitutional cause for its origin; excepting cases of acute disease in children. Thus, deposit in the vesicles rarely occurs, unless it be of a scrofulous character, or lobular, except the blood be diseased, as in pyæmia, while a rapid consolidation of a whole lobe may occur in a person constitutionally healthy. I state this merely in general terms.

Lobular Pneumonia.—Although this form of pneumonia is called lobular, the inflammation is rarely confined to individual lobules, but to a number of these divisions, or a group of lobules, their amount being determined by the size of the branch of pulmonary artery which is primarily affected. This form of pneumonia is met with as an idiopathic disease in children; also as a chronic disease in scrofulous subjects, constituting a variety of phthisis; but, apart from these instances, it is mostly a secondary affection arising from a diseased state of blood in pyæmia, or, as it was formerly called, phlebitis. The peculiarity of this form of inflammation is its rapid progress, and its termination in abscess, or sloughing. Its most frequent seat is the lower edge of the lobes, especially the inferior, where firm masses of consolidated lung may be seen, each mass averaging in size that of a walnut, but may be greater or less. On cutting through these masses, the various stages of inflammation may be seen, one perhaps being in a state of red and another of grey hepatization, and another of abscess; thus these stages occur in rapid succession, and in the more favorable cases in the order already mentioned; and where recovery takes place, which is probably very rare, merely the hepatized state has been reached; but as a rule the disposition is to rapid disintegration, and thus within two or three days after the first onset of inflammation, symptoms of sloughing or suppuration occur, the tendency being always to form an abscess. The disintegrating process probably comes on very soon after the first inflammatory stage; and no sooner is the exudation poured out, than a rapid breaking down of the tissue ensues, and thus the lung may be found softened, or sloughing, with the surrounding parts only in the first stage of inflammation. It is worthy of remark, how this form of disease occurs near the surface of the organ, as it does also in the liver, &c.; and the same is true also, though to a less extent, of adventitious products in general, the cause not being positively made out. Since this is the case, the pleura becomes involved in the inflammation, and thus every diseased portion of tissue is covered with a layer of lymph; and in some cases the whole lung is thus covered, or a general acute pleurisy has taken place. In this instance the abscess has generally burst into the pleura, and so caused the serous inflammation. This form of disease, or lobular pneumonia,[1] is generally connected with purulent absorption or infection, and is thus most frequently the immediate cause of death in pyæmia arising from injuries, operations, &c.: it was once thought that the pus was actually carried from the distant part to the central organ, and if no pus were present there, it was formed in the vein by phlebitis; but the disproof of this is, that all the stages of inflammation preceding the production of pus, are present; there can be no doubt that something is carried to the lung from the infected part, and, although this is not actual pus, it is probably some of the elements of pus, or other infecting matter, for experiments have shown that the disease is produced after injecting such into the blood. When this has been done, the immediate effect produced is a coagulation of the blood; or, if smaller quantities be used, it permeates into the smaller vessels, and there produces its effects, the first indication being a spot of congestion from the blood having coagulated in the minute pulmonary arteries; thus, on making a section through a lung the subject of lobular pneumonia, you will find, as I have already mentioned, the various results of inflammation; and preceding these, parts of the lung of a red color: these patches of congestion being the first step in the process, and, since in each mass the more rapid changes are towards the centre, an abscess may be found in the midst, the surrounding part hepatized, and the circumference of a red color from this congestion of the tissue. It is highly important to notice these congestive patches, for I believe they always show blood disease, as I have already mentioned as occurring in fever and purpura; and in cases of purulent infection, precede the further inflammatory changes.[2]

Vesicular, or Catarrhal Pneumonia.—This is a very important affection, and constitutes, for the most part, the inflammation of the lungs of children. As a chronic disease, it is mostly of a scrofulous kind, and is a very frequent form of phthisis. I have often told you, that the inflammation of the lungs in children is not like that of adults, consisting of a hepatized or solid organ; and that you will not discover physical signs indicating this during life any more than its existence after death, but merely bronchial râles throughout both sides of the chest, indicating a general bronchitis, which in fact is really the child's form of inflammation of the lungs. In cases which recover, the disease has probably advanced no further; but in those which are fatal, the inflammatory process has proceeded down the tube into the tissue of the lung, and thus, at the termination of a certain number of bronchial twigs, a lobule of lung has become involved; an exudation is thrown out into its cells, and consolidated it. If the disease has not far advanced, it may be overlooked, but on examining the texture carefully, a number of portions of the lung may be thus found airless, and of a red color; some, no doubt, are merely collapsed portions, but most of them are soft and granular, and exuding some lymph, when squeezed; moreover, showing abundance of cells when placed under the microscope. The affection is more manifest if only one lung should be affected, or a part of a lung, when the stage of grey hepatization is reached, and the tissue is found filled with a number of small white masses not larger than millet seeds; these are the lobules filled with exudation, and are very likely to be called scrofulous, or tubercles, by the inexperienced eye; indeed, such vesicular pneumonia, when occurring with disorganization of the lung, is very frequently called tubercle. In this specimen[1] labelled tubercle, it is very probable that the appellation is correct; but a mere glance at it through the glass does not show anything more distinctive than this form of disease of which I am speaking. The diffused character of the disease does not strike the sense so much as a uniformly consolidated lung, and thus its severity may be overlooked; but you should open all the bronchial tubes to examine the membrane, and secretion from it, and afterwards the tissue, when, by squeezing and close inspection, you will find the lobules airless, and an exudation in some of them.

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[1] 1725^{73}.

[2] The importance of this condition was strikingly shown, about two years ago, where it might have been made the means of convicting, or not, a man charged with murder. The prisoner was the captain of a ship, and charged with being the cause of the death of a boy who had sailed with him. The boy was brought to the hospital, and shortly died; he was covered with sores, arising from lashes he had received, but the immediate cause of death was a congestion of the lung, seen by a number of ecchymosed patches all over the organ, and associated with some bronchitis. There was very little scientific doubt that the state of lung indicated a blood-poison, and the only source of this was the abraded integument. As, however, it could not be positively said in a court of law that it did not arise from cold, the doubt went in favor of the prisoner.

In all probability that is a similar affection which was formerly styled *peripneumonia notha*, or bastard pneumonia, a disease about the nature of which, as described by the older writers, there has been much controversy; but I have no doubt that the disease was like this one of children, and thus we may notice in morbid anatomy, as well as in other respects, how senility is second childhood. The cases called thus, were those where during an attack in old bronchitis a sudden and difficult breathing came on, which was speedily fatal, and evidently denoted an obstruction in the pulmonary tissue; the post-mortem inspection, however, revealing only a bronchitis, or no evident consolidation of the lung; a careful examination of the tissue however, in such cases, will show that the inflammation has crept down to the vesicular structure which terminates some of the bronchial twigs, and that these have been rapidly filled with exudation; at the same time, other portions have collapsed from the bronchial obstruction, and then the violent symptoms and rapid death.

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[1] 1733.

Typhoid Pneumonia.—It has been thought by some pathologists and writers on fever, especially the German, that in typhoid fever the whole body is peculiarly affected, and that various organs especially suffer. The ileum is the part where the diseased condition more particularly exhibits itself, but all other organs, we know, participate in a morbid state, and especially the lungs, recognized by the dyspnœa, cough, sanguineous expectoration during life, and the congested or inflamed condition found after death. The only question is, is this affection of the lung peculiar—that is, is it due immediately to the typhoid process which shows itself in so characteristic a manner in the intestine—or is it merely due to the state of fever, and the consequent alteration of blood and tissues of the body? It is said, by those who believe the pneumonia to be peculiar, that the microscope shows characteristic cells of the same form as those in the ileum and mesenteric glands; but then, in objection to this, it may be said that, admitting the peculiarity of the intestinal affection, it is not satisfactorily shown how the deposit in it is peculiar, when viewed by the microscope, or that it is recognizable when examined. If, then, there be doubt about the microscopic peculiarities of the elements of the typhoid deposit in the intestine, and we trust rather to the naked-eye appearance for its recognition, how much more difficult is it to speak of the peculiarity of a similar affection of the lung, when the outward appearances are not so distinctive? It is thus thought by some, and with good reason, that the form of pneumonia found in typhoid fever is duemerely and necessarily to the state of blood, tissues, and position of patient. It is an appearance important to recognize, for though not, I believe, characteristic, yet, when associated with other conditions, assists in marking the disease. In all fatal cases of typhoid fever, the lungs are found gorged with blood of a dark color, and present a spotted appearance both externally and internally, as I have just mentioned is generally the case in blood diseases; it is a stage beyond this, however, which constitutes inflammation, but so intimately are the two connected, that the one gives the other its peculiar characters, and, indeed, the general appearance of the organ and the part affected show how much the morbid state is due to a mere blood disease. Thus, as the congestion and ecchymosed appearance occupy the back part of the lung, so does the pneumonia, and it is, therefore, at the posterior part that we find consolidation; it is not hepatization of one lobe or another, as in ordinary pneumonia, but the posterior edge, and especially the part near the root of the lung, that is affected, and seldom passes beyond the stage of red hepatization; this is not uniform, but occurs in patches, and thus, if a section be made, it appears as if a number of lobules had been separately inflamed, leaving some healthy portions between them, or certain number of lobules in complete state of hepatization, while the tissue between is recently and acutely inflamed. If the inflammation extend beyond this, and affect a larger part of the organ, it may be looked upon as a complication, in the same way as an ulceration of the intestine following the typhoid process in the ileum. The reason, as I have said, why I am not sure that this condition is peculiar to typhoid, is that it may be sometimes met with in typhus; in the latter disease, it is rare that the lungs are inflamed, but if so, in a very similar way. Also, as regards the enlargement and softening of the *bronchial glands* before noticed: this has been considered by some as a peculiarity of the affection; but this is certainly not so, for they are generally found affected in all cases of pneumonia, and more especially where a large part of both organs is involved.

Hypostatic Pneumonia.—This is a term used to express that condition of the lung which you so frequently see in the post-mortem room, affecting the posterior parts of the lungs. You will see, almost every day, lungs removed from the body which at their front parts are dry, spongy, and natural, but having the back parts doughy, heavy, and when cut exuding serum; this condition, conjoined with increased softness of texture, is that which characterizes inflammation, and therefore the term pneumonia is adopted; as, however, it does not come on until the patient is dying of some other disorder, it is called *pneumonia des agonisans*, or *pneumonia morientium*, and must be looked upon rather as a result of the act of dying than a cause; and this is not difficult to understand, when we consider the prone position of the patient, without any movement for days, and a disordered state of blood, as well as a commencing decay of the tissue, for you have already seen how, in fever, the back part of the lung, from a mere mechanical reason, is the part most liable to the morbid change; and then, if to these be added the decaying powers of the brain and nervous system, whereby the influence of the pneumogastric nerve is weakened, we gain some idea as to the cause of this process. In some cases, we find the pneumonia has reached the stage of hepatization; and then a question arises whether this be the same form of disease further developed, owing to some accidental prolongation of the patient's life, or whether there be any especial exciting cause for the inflammation: if the pleura be affected, I should have no doubt in saying that such is the case; thus, in Bright's disease, where an early condition of pleuro-pneumonia is so often found unexpectedly, there is a special cause for its production, and more than can be found in the mere act of dissolution.

Gangrene of the Lung.—This may occur under various circumstances, and to a variable extent. It is usually divided into *general* and *local*, or *circumscribed*, although these do not actually correspond to many cases frequently met with. The former is generally intended to apply to a general gangrene following inflammation, whereas the local arises from an accidental death of a particular part. In the majority of cases, however, which we see in the post-mortem room, it arises from the lung being involved in the disease of a neighbouring organ; thus, in cases of cancer of œsophagus, you will generally find the adjacent parts of lungs, those near the root, in a state of hepatization or purulent infiltration, and, at the same time, sloughing or gangrenous; you will see, on section, a quantity of green, dirty fluid exude, the tissue broken up in shreds, and the odor indescribably fetid. This, many of you know by handling such an organ, when you will find the odor attaching for many hours to the hands, and very different from the ordinary smell of decomposition. In cases of aneurism of descending aorta, the same may occur, from pressure; and I have seen it, two or three times, result from caries of the spine. I might here warn you not necessarily to expect a gangrene of the lung because there has been a fetid expectoration during life, for this may occur, sometimes, in connection with bronchitis, and which Dr. Laycock states to be due to a compound of butyric acid which is formed in the lungs. In the *general form* of gangrene, an ordinary idiopathic inflammation has preceded,—a pneumonia, in fact, has run on to gangrene; you know, in other parts of the body, this is one of the consequences, but it is so rare in pneumonia that I did not mention it among the usual terminations; it does, however, sometimes occur, and generally arises from some constitutional cause or epidemic influence; thus, I do not think I have met with a case for a considerable period, although a few years ago we had several such cases, but could not account for the occurrence except on the supposition of some epidemic or influenza; in these, the pneumonia rapidly passed into gangrene. In these cases, the dead part passes by insensible stages into the healthy, there being no distinct boundaries between them; the most affected parts being soft, shreddy, and having a horrible odor, while the tissue around is soft, and exudes a dirty-colored fluid. In the *circumscribed form* of gangrene, a portion of lung is found isolated from the surrounding parts, and is dead; this may result from a simple inflammatory process, and is due, no doubt, to the stoppage of the bloodvessel proceeding to it; this more frequently occurs in the chronic inflammatory processes in the lungs, and sometimes it arises, as Dr. Addison used to teach in this room, from apoplexy of the lung, whereby blood being effused into the tissue, its nutrition ceases, and death of the part results. You must see fresh specimens to recognize the true appearance, as these[1] only show ragged tissue, but this drawing[2] exhibits an isolated portion of dead lung, as in the wet preparation.

CHRONIC PNEUMONIA, CIRRHOSIS, AND LOCAL INDURATIONS.—As I have before frequently stated, chronic disease may be a result of acute, but this is more especially in the serous membranes, while in the parenchymatous organs the chronic constitutes a distinct process, and, in the case of the lung, the two diseases are altogether different in kind, for in one the attributes of acute inflammation are wanting during life, and the appearances are altogether different from it as found after death. Thus, in ordinary acute pneumonia, the exudation is poured into the cells in large quantity; should this occur more slowly, the material is generally of a scrofulous character, and only isolated spots of the lung are affected, as I shall mention under

[1] 1730, 1731.

[2] Drawing 248^{85}.

Phthisis. The term chronic pneumonia I use in an analogous way to other *chronic inflammations,* where the process is slow, the new product of a fibrous character, and more allied to a growth. The most usual site for such a condition is the upper lobe of the lung, in cases where physical signs of disease have existed for some period; and is found where death has arisen from other causes, and where there is no tendency to tuberculosis. On cutting through the apex of such a lung, the tissue is found very dense, as if the knife were passing through a tumor; it is almost or quite airless, and the texture exceedingly hard, so that it is impossible to thrust the finger into it; it is also of a darker color than natural, and this is one feature of it which you must remember, that wherever a chronic inflammation takes place in a lung, there you will find the pigment increased; not only is there the usual coloring matter, but more also is added, and this sometimes in considerable quantities, so that black matter may be scraped off the cut surface with the scalpel.[1] If the microscope be made use of, this hard part will be found composed of fibre tissue, occupying all parts of the lung, and uniting it together in one mass. You probably ask whether this may not have been formed from an acute inflammatory product, and subsequently organized. This is a matter I have already considered under Pericarditis, and is one not yet determined; for my own part, I believe such a process is essentially chronic, and at no time, if an opportunity had been given for examining such a lung, would it have presented any different appearance, except in amount; growing, indeed, like a tumor, and like it having, no doubt, some elementary forms preceding the fibrous structure, but the mode of production and development so slow and continuous that no distinct stages or changes in the structure can ever be distinguished. In this form of complaint, we have rarely any symptoms indicating a previous inflammatory process, though sometimes, however, as in specimens I shall presently show you, a difficulty in this respect does arise. Occasionally, when the process has ceased and a contraction has taken place, the cut surface may be granular, and the appearance of tubercles presented, but I would warn you against mistaking it for them. In these indurated parts, the cellular tissue around the bronchial tubes which pass through them is also involved, and the tubes themselves are stretched more widely open. If the whole lung should be affected in a similar way, the term *cirrhosis* has been

[1] 1726^{75}.

given, on account of the resemblance and supposed identity of process to the hepatic disease of this name. In this case, the whole lung is virtually destroyed, the spongy tissue which naturally composes it being replaced by a dense fibrous structure; the organ is generally adherent to the chest, and requires to be cut out, and often so dense that it is incised with the greatest difficulty, being often, indeed, much harder than cartilage. On squeezing, no air or fluid exudes, but the surface is smooth, and consists simply of fibrous tissue, colored by the natural pigment of the lung; throughout are seen the tubes of all shapes and sizes, these being altered, as Dr. Corrigan first explained, by the contraction of the intervening tissue, by which they become pulled open; they are thus found irregularly dilated and contracted, and in many parts forming almost round cavities.[1] In these cases, the pleura is also involved, and is exceedingly dense and hard, and adherent to the chest. It is especially owing to this that the opinion of an acute pleuro-pneumonia having preceded it is held to be necessary; no doubt, this very often is the case, an inflammation tolerably acute in the first place may continue for some time, and then a general induration follow; if so, however, I think the inflammation must have been confined to the pleura, for I do not think it has ever been satisfactorily shown that a general acute pneumonia may become chronic; in cases of pleurisy, however, where much lymph is effused and contraction takes place, the lung may be secondarily affected, and the induration, commencing on the outside, may proceed inwards, in the same way as cirrhosis of the liver sometimes occurs. Such a specimen, styled chronic pleuro-pneumonia, is seen here.[2] I am quite sure, however, that a cirrhosis may occur without any acute disease at the commencement, the case being chronic throughout, for in one instance especially, which I watched for nearly five years, and one of the most extreme I have witnessed, the pleura was almost an inch thick, and the man had never suffered from any acute attack. These are the cases called chronic phthisis, which continue so many years, and where dulness on percussion, signs of cavities, &c., are so well marked.

PHTHISIS.—This subject is so extensive that I can do no more than give a mere outline of the general characters of the disease, leaving the demonstration of the various forms of phthisis for the fresh body in the dead-house. I would first of all remark that the term is used in a very large sense, as signifying most of the disorganizing diseases of the lungs, phthisis being no longer applied to any wasting malady, but always supposed to refer to the lungs; and again, it is considered by some as synonymous with a scrofulous affection, but this cannot always be said to be the case; tubercles often being absent. The subject has, however, generally been considered solely in connection with tubercle, a tuberculous deposit having been looked upon as the basis of the whole of the changes in the organ, and affording the clue to the pathology of the morbid process. If all the deposit found in a diseased lung be styled tubercle, then it would be necessary to adopt such a method; but you are aware how Dr. Addison has, for a long number of years, strenuously opposed such an idea, and shown how many of the disorganizing processes are due to an inflammatory change, as in other organs. Great difficulty exists in defining what is a true tubercle, for the expression strumous or scrofulous pneumonia, shows how an inflammatory and tuberculous deposit may approach each other, and therefore it is probable that the same appearances are described by authors under different names. First of all, as regards tubercle, you will find in books a great many varieties described, according to mode of diffusion, consistence, age, &c.; but I will merely mention the two commonest and most striking, and which you are every day meeting with: the one is the *miliary tubercle*, of the size of a millet seed, hard, semitranslucent, and round, and called by some crude; the other, or *yellow tubercle*, or ripe, composed of yellow, soft, opaque, and friable matter. The microscope shows the former to be composed of fibres and cells, while the latter consists only of irregularly shaped cells containing fat granules. The terms *crude* and *ripe* convey the idea of Laennec, that the first is the originally formed tubercle, and that subsequently it softens into the yellow variety; although this may sometimes take place, there is no proof that such is the process continually in progress, for the soft yellow matter may be produced undoubtedly without any miliary tubercle having preceded it; indeed, a yellow soft material, containing irregularly shaped cells, is the degenerative change into which simple substances of a fibrous or cell character pass, and thus the difficulty which often exists in knowing whether such a material has had a tuberculous origin or not, for we see a cancerous tumor degenerate into a substance of this kind, in the same way as an enlarged scrofulous gland; the only positive proof, however, of such soft material being tuberculous, is the fact of its capability of being broken up into distinct tubercles or granules. In the phthisical lung all are agreed as to the nature of miliary tubercle, or the first variety mentioned; but it is with respect to the second that the controversy exists, for in many cases it is impossible to say that such yellow soft matter is not merely a degenerated inflammatory product, for I have already said, in speaking of the pneumonia of children, how easily is the vesicular deposit mistaken for tubercle. You see, then, that with some persons it is necessary to find distinct evidence of tubercle before the case can be called true tuberculous phthisis, while with others the scattered deposit of every kind throughout the lung receives the name. I think few can entertain any doubt as to the two forms being quite distinct in formation and character. I have already said that the miliary translucent tubercle formed in the first place from lymph, is of a fibrous structure, and grows in the cell wall until of such a size that several air vesicles are occupied by it; thus if a section be made of it, it will be seen to occupy perhaps a dozen cells, with their fibrous partitions or trabeculæ in the midst of it; the soft yellow tubercle appears to approach an inflammatory product in being formed in the cells themselves, until a certain number are filled by it. It is still a question, remember, how morbid products are formed in parenchymatous organs: whether they are altogether new, like the lymph cells exuding from a free surface, or whether they be not essentially the normal cells themselves which have undergone a rapid and morbid development: whether, for example, in the lung the pulmonary epithelium (if it exist) be altered in character, and its own cells constitute the tubercle. Be this as it may, the soft product, like that of ordinary inflammation, arises in the vesicle itself and blocks it up.

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[1] 1718^{68}, 1743^{45}.

[2] 1729^{90}.

It is the latter product which is the most important in phthisis, and it is this especially of which I shall speak, for in very many cases no miliary tubercle can be discovered, and I regard it quite as an accidental circumstance whether it be found or not. The essential process in phthisis is the deposit of, and changes in, the softer material; this is sometimes associated with miliary tubercles, but often not; and if they be there, the question arises, did they precede the softer deposit, or have they been developed at the same time? With reference to this point, the most opposite opinions exist, some thinking that they may remain inert in an organ for years until an inflammation causes further mischief, and discloses them after death; others thinking they may be developed as rapidly as an inflammatory product: in a case, for example, of general tuberculosis of the lungs, with acute symptoms, it is thought on the one hand that the tubercles have brought into action a bronchitis or inflammatory process which has proved fatal; while, on the other hand, it is thought that during this acute illness, the tubercles may have rapidly formed themselves. In favor of the former view, it is said that they may be found accidentally in those who die of other diseases; but if this be so, it is exceedingly rare, and in the case of one organ, the brain, I have never yet met with them in extreme examples of tuberculosis, unless attended with acute disease. Also in ordinary cases of phthisis they are found generally in the diseased parts, whereas they should be met with also in the comparatively healthy portions preceding the acuter changes. All which observations, and many others, make me believe that tubercle may be very rapidly formed; I should say, however, that the true miliary tubercle is undoubtedly of slower formation than the other, whose development I believe is always accompanied by symptoms.

In cases of *acute tuberculosis*, where the whole of both lungs is stuffed with tubercles from apex to base, death occurs long before any disorganizing process can ensue, and the affection is generally accompanied by a bronchitis, and the lung found red and very vascular. A local deposit of tubercles also may occur, and these may subsequently shrink into a hardened mass, though when this takes place, probably some inflammatory product has been formed around them; thus groups of this kind may be found scattered throughout the lungs, constituting indurated masses of tissue, care being taken not to confound the simple chronic pneumonia, as I before mentioned, with tubercle.

In speaking now of the ordinary disorganizing processes seen in phthisis, I shall dismiss from consideration miliary tubercle, which may be present or not, but look to the material which is all essential in the various phases of the disease. This material is formed in the cells in the same way as ordinary inflammatory products, and thus, although these two stand at the extreme ends of the scale, as scrofulous disease on the one hand and simple inflammation on the other, yet they pass into one another by insensible degrees. You will see, then, how in one case the material thrown out in a highly scrofulous subject shall be but little organizable, and shall soon soften down into cavities; how in another case the process in the lung shall be of an acute kind and the material occupy large portions of lung like ordinary pneumonia, and be rapidly fatal; and how in a third case the material shall be partly of the inflammatory kind, and more slowly organize as in chronic pneumonia, accompanied by induration, as I have already mentioned under this head, and cirrhosis. All these states are seen combined in the majority of cases of phthisis—a broken-up tissue, an organized or indurated tissue, and an acute inflammatory material. Another explanation given of such processes by those who maintain a tuberculous substratum in all instances is, that inflammation is set up around the tubercles, and these changes are seen in its exudations. My own opinion, however, is, that although the scrofulous yellow matter is one thing and a pneumonic deposit is another, just as an ill-formed cell differs from a well-formed cell, yet that the two pass by insensible grades into one another, and thus all varieties of scrofulous and inflammatory processes may be constantly found in the same lung. The inflammation, whether as an essential part or secondary, is proved to be present by the pleuritis, which invariably accompanies the disease.

In an ordinary case of phthisis, which has had about a twelvemonth's duration, you find the upper part of the lung where the disease began, much disorganized, full of cavities, and at the same time the intervening tissue indurated; as you proceed downwards, you find less induration and a deposit of a whitish-yellow color, approaching that of hepatized tissue, while at the extreme lower portion of the lung it is not unusual to find acute pneumonia, which has caused the immediate death of the patient. Thus, as a rule, the disease begins slowly at the apex and travels down in a more rapid manner, and so, although you find a large cavity at the upper part, the tissue around it has had time to become indurated, and the cavity to have hard walls; lower down at the inferior portion of the upper lobe, or superior portion of lower lobe, you find small cavities of a more recent character filled with purulent matter, and the tissue around occupied by a solid whitish-yellow matter resembling in general aspect that of grey hepatization of pneumonia; while still lower down, several distinct masses of this may be found, and very often the lower portion of all is the subject of acute inflammation. No two cases are alike in these respects, and the deposit seen may be in very small points and scattered through the lung, and of a more decided tuberculous character. The pleura also shows the direction which the disease has taken, thus the apex is sometimes found adherent, while other portions are free, though more commonly the whole lung is fixed to the chest, but then the pleura of the upper lobe is the most thickened, as showing the older and more chronic process.

Let us look for a moment at acute pneumonia on the one hand and simple scrofulous disease on the other, or tuberculous if you will; meaning that where the deposit is soft and yellow, for I have altogether done with the miliary. In the one case a person not of scrofulous diathesis, has in a few days the whole lung consolidated by the pouring out of an albuminous material into the vesicles of the lung; while, in the other, the deposition is only into a few vesicles, and the process is slow; the former is an ordinary pneumonia, and the latter a highly scrofulous affection; but we occasionally meet with a disease intermediate between the two, and to which it would be difficult to give a distinct name. As examples, I may mention two cases which occurred during the last session in the clinical ward, both happening in young girls; in these instances the disease had existed for six weeks and two months respectively, and occurred in scrofulous persons previously in good health; the affection ran an acute course, and on examining the lungs, large white masses were found in them averaging the size of an egg, and the centre of all these was softening. Here was a case, then, which was like pneumonia in the acuteness and activity of the symptoms, and in the fact of large masses of the lung being consolidated as in hepatization, the naked-eye appearance being exactly like that condition; and it was like tuberculous disease, inasmuch as it was an affection of weeks instead of days, and instead of a whole lobe being involved, only portions were affected; and instead also of the usual changes in pneumonia, as purulent infiltration, it was softening as in tubercle. Such a case forms a disease midway between true phthisis and pneumonia. A more common form of disease is one less acute, though following a very rapid course, the tissue being occupied by deposits of albuminous material undergoing softening; and this constitutes one form of "galloping consumption," or, as it is scientifically styled, *pneumonic phthisis*, where patient is only ill a few weeks with acute febrile symptoms. Now, let us see how phthisical disease approaches to chronic pneumonia or cirrhosis. This, as I have already mentioned, is a malady of years' duration, in which the lung becomes changed into a hard, tough, fibrous tissue, the dilated tubes form cavities within, and the pleura becomes very much thickened. This condition in its simplicity is also opposed to tuberculous disease, but yet the two are found in combination, or approach one another. Thus, although we may look upon simple tuberculous or scrofulous deposit as one thing, simple pneumonia as another, and cirrhosis as a third, yet in most cases of phthisis a combination will be found: the question being, as I before said, whether the product which organizes or is allied to the ordinary inflammatory material is an essential and necessary part of the exudation, or whether it be secondary to the purer scrofulous deposit: my own opinion being an affirmative to the former.

If, then, you make a section of a lung, as I before said, affected with phthisis of some duration, you may see that the disease has commenced at the apex in accordance with the physical signs during life, and that a small amount of this albuminous material is thrown out into the tissue. A part of this softens, by which a cavity is produced, and a part organizes and changes into fibrous tissue, and becomes hard: thus the interior of the cavity is formed of hardened lymph, and the tissue around between the vomica and surface of the lung indurated like that mentioned in cirrhosis, and this chronic inflammatory condition reaches the pleura, which is also much thickened and closely adherent to the chest; through this hardened portion the bronchial tubes are found passing and dilated. While this slow process has been going on at the apex, fresh deposit has been forming below, for the disease, as you know, gradually creeps downwards, and as it progresses so is it more acute. Thus in the middle portion of the lung, the adventitious matter will be softer, the cavities not so well formed, and the tissue around them scarcely changed into the hard fibrous structure, the whole character of the process being not so chronic as in the upper part; below this again, in the lower lobe, you find the deposit as it occurs in a more recent state, and very often is nothing more than hepatization arising from an acute pneumonia as the latest and fatal change.

I did not wish to prolong this subject as to the nature of these processes, for I might spend half-a-dozen lectures upon many debated points connected with them, and I have therefore presented you with the extreme forms of disease met with in the lungs, as acute tuberculosis, simple pneumonia, chronic pneumonia, and cirrhosis; and stated that you will find more or less of these conditions in nearly all cases of phthisis. In acute cases a rapid production of scrofulo-pneumonic deposit rapidly breaking up; in more chronic cases, the disposition to cirrhosis and an induration of the lung combined with cavities.

As regards true miliary tubercle, not believing that this necessarily precedes the softer exudation, I leave it untouched, as the progress of phthisis I think is essentially related to the deposit and changes of the yellow matter. If miliary tubercle exist it is found mixed with the other material, but I believe it can never be foretold whether it be present or not. The two, of course, are intimately related, and probably differ as a slow growth differs from a recent exudation, and the scrofulous character of phthisis is shown by its association with tuberculous disease elsewhere; for in some extreme cases, tubercles may be found throughout the body, nevertheless, in many cases of phthisis there is no disease present except in the lungs.

As regards the cavities in the lungs, you will find these vary according to the age of the disease; in the more recent deposit, a mere hollow will be found containing pus and broken-up material; while in the upper lobe, where the disease is older, the cavity may have a hard wall, and have travelled down the organ to some extent. During its formation the bronchi and bloodvessels are differently affected; the latter become closed and forming hard cords, are seen traversing the vomica from side to side, and thus hæmorrhage is precluded. If you cut through one of these you will see the obstructed vessel within, and thickened externally by indurated lymph, and sometimes remains of lung tissue upon it. Just as the vessels are thus obstructed, a different process occurs in the bronchial tubes; these are destroyed, together with the lung tissue, and so are gradually worn down even with the walls of the chamber, and are found opening on its surface, and through these the contained matters are discharged.[1] Sometimes a cavity is round and circumscribed, with hardened walls; at others it proceeds downwards, forming a long straggling space with the obliterated bloodvessels traversing it. As I before said, in the indurated parts of the lungs, the cavities there found communicating with the tubes may have resulted in an expansion of these tubes, although when large it is difficult to prove this; for all trace of the original bronchial mucous membrane is gone, and the cavity could not have been produced without a corresponding wasting of the parenchyma around it, and thus it is often useless to discuss the manner by which such cavities are formed. It is only, however, in indurated parts of the lungs that such can occur, and, therefore, in cases of chronic pneumonic phthisis the cavities found within it are generally expanded bronchial tubes, the indurated tissue being little prone to soften.

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[1] Preps. 1740 and 1742^{40}, showing cavities and numerous other preparations of phthisis.

I had intended, had I had time, to have given you the average age of those dying of phthisis, for you would be surprised to find that this is much greater than is generally supposed; being, I believe, above thirty years. You will soon find that no age is proof against the disease, and that we constantly examine old grey-haired persons dead of tuberculous affection of the lungs.

You will constantly find remnants of disease in the lungs of those we examine, showing that the affection under consideration is curable; what we generally meet with indicating this is the apex of a lung adherent, and its surface puckered, and, on making a section, the tissue is indurated, dark, and only in part permeable to air, and often containing earthy or chalky matter. The probabilities are, that in these cases a deposit of tuberculous matter, with some inflammatory exudation, occurs at the apex, and, instead of this softening or increasing, it ceases under some advantageous circumstances, and dries up, but the indurated tissue remains, and with it any earthy constituent of the tuberculous matter. It has been thought by some that this puckered tissue, having often a cicatriform appearance, represents a closed cavity, but there is no proof that this ever occurs. Probably, if a cavity has once formed, it never closes. The earthy matter found in the lung is sometimes expectorated during life, as found in these specimens.[1] Curiously enough, a kind of mould may form in old phthisical cavities, as described by Bennett and Bristowe; this parasitic fungus (but probably there is more than one) is mentioned by Küchenmeister as the aspergillus pulmonum hominis.

Adventitious Growths.—These, for the most part, are secondary, and are of all kinds; probably there is no description of tumor occurring on the surface of the body but what may recur in the lungs, and thus we meet with cartilage, bone, myeloid, &c., in these organs, as well as the more malignant growths; but very few of them occur as primary diseases of the lungs.

Cancer.—Primary cancer of the lung is a very rare disease, but, when the organ has become involved in carcinoma to a great extent, and neighbouring tissue, the general term of intra-thoracic cancer has been given. You may be surprised, perhaps, to hear my opinion that primary cancer is uncommon, considering how frequently we meet with carcinoma of this organ; but my explanation is this, that in those cases where this constitutes the sole or principal disease, the morbid product has commenced in the bronchial glands, and involved the tissue secondarily. I would, therefore, say that cancer of the lung is generally of *two kinds*,—that where the parenchyma is filled with cancerous masses, *secondary* to a similar affection in another part; and that where the lung is occupied by a mass of disease, which may be limited to the chest, and which, in contradistinction to the other, may be called *primary*, although it has its origin really in the bronchial glands. The first form, where the cancer is found diffused through the lungs, is met with in cases where the disease has originated elsewhere, as after the removal of a cancer from a limb, or following the same disease of stomach, liver, or other abdominal organs; also, often after cancer of breast, either as distinct and separate deposits, or by actual contact from growth through the thoracic parietes. The cancer may be scattered as minute tubercles throughout the tissue, or in the form of large nodules, and very frequently seen as projecting flattened nodules on the surface of the lung. Sometimes, as before mentioned, they appear on the pleura, as hard, smooth plates, resembling cartilage.

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[1] 1745, 1747.

The second form of cancer, or *primary*, as it is generally called, because, perhaps, the only part of the body affected, or from constituting the disease from which the patient suffers and dies, has its origin, in most cases, in the bronchial glands, and then creeps into the parenchyma along the outside and course of the tubes; generally, a large mass may be found encircling the root of the lung and involving the organ at this part; if a section be made, the cancer will be found forming a layer around the tube, and proceeding with it, sometimes, to the most distant part of the lung; thus, if the organ be cut through, no disease may be found in the parenchyma, but the sections of the tubes will be seen encircled by a dense mass of white tissue. In some places, particularly if the disease be of the very hard or scirrhous kind, the tubes will be found contracted, and in some cases cancerous tubera will be discovered growing through the tubes into the interior.[1] In some cases, where you find a large cancerous tumor in the chest, and it

[1] 1751^{35}.

would appear most unlikely that the disease proceeded from the root of the organ, you may, on removing the parts, find the lung compressed, and comparatively unaffected, while the adventitious growth has sprung up on one side, and really in the way I name. In these specimens,[1] you see cancer on surface of lung. The form of cancer mostly met with is the *medullary*; vascular, and giving out much milky juice, it is seldom, however, very soft, unless it grows quite out from the surface; when the disease exists to a less amount, it is often harder, contains a fibrous matrix, and may be styled *scirrhous*: an example of this you saw the other day, in a woman who died of cancer of the breast. *Melanosis*, I have repeatedly before said, may be nothing but cancer accidentally colored by pigment, as I think is the case in this example,[2] where it returned in the lungs after removal of the eye.

Epithelioma.—In cases of epithelial cancer of œsophagus, I have seen, in one or two instances, the adjacent part of lung involved in the disease; and in one case, distinct deposits at a little distance.

Recurrent or Malignant Fibroid.—These are generally secondary to the same disease elsewhere, as when, for example, a recurrent fibroid tumor has been repeatedly removed from an extremity, the disease at last appears in the lungs. It is not very common, and may be called semi-malignant. In this specimen,[3] you see such tumors, which proved fatal in the lungs after similar ones had been removed from the skin several times; they consist of hard, round, firm fibrous masses. This specimen[4] shows a primary disease of this character, where the lung is involved in a fibrous or fibro-cellular growth; it is the only case of the kind I have seen.

Osteosarcoma.—I have already stated my belief that this disease is merely a fibroid tumor, with the addition of bone, owing to its proximity to osseous structure; sometimes, after removal, the same form of growth appears in the lungs, as round tumors composed of fibre and bone, the latter being true osseous structure, and constituting, generally, the circumference, as you see in this lung,[5] and several other specimens.

Osteoid Cancer, or Malignant Osteoid.—This is a bony growth of a malignant nature, as I have already described, and it may occur secondarily in the lungs, after removal from another part.[6]

Bone may, however, occur as a primary disease, although so rarely that it may be a question whether or not a malignant osseous tumor

[1] 1780, 1782.

[2] 1752^{10}.

[3] 1750^{20}.

[4] 1749^{45}.

[5] 1750^{60}.

[6] 1750^{45}.

has not been present as a primary disease in some part of the body, and overlooked. I have already alluded to a case where bony plates were found on the surface of the lung.

Cartilage, or Enchondroma.—This is not common in the lung, either as primary or secondary disease, but is occasionally met with under both circumstances; thus, I have seen the remarkable specimen in St. Bartholomew's Hospital, related by Mr. Paget, where the lungs are full of cartilage, and which was secondary to enchondroma of the testes. This specimen[1] of cartilage was removed from the lung, and purports to be a primary and local growth.

Myeloid.—In this specimen[2] you will see a myeloid disease of the lung. This form of growth is probably much less malignant than any I have mentioned, and this constitutes the first specimen I have seen, the disease being generally quite local and innocent. You will see by the mode of growth how it differs from cancer: instead of being in the substance and infiltrating it, it springs from the surface, and thus you notice the pendulous character of these tumors; I know of no other specimen of growth resembling it. They show the true myeloid structure, consisting of a red-colored soft material.

Various combinations of these may occur in the lungs, as in the original tumors, and thus in this specimen[3] there are masses composed of cancer, myeloid, and bone, as in the primary growth which was removed from the leg.

Tubercle.—This I have already mentioned, and a specimen[4] you see here. Its favorite seat is the upper part of the lung. Much has been written about the seat of tubercle, and its frequency of occurrence in one organ rather than another. Louis has said, that after the age of fifteen it can never occur in any organ without the lung being affected. I think he is right, and might even have carried the age still lower, or speaking in general terms, and allowing only a very few exceptions, tubercle may be said to be never or very seldom developed in the interior of the body without the lungs being affected. I have already said, that in acute hydrocephalus (and the same is true in most other tuberculous affections) the lungs may nearly always be found to contain tubercles. The age mentioned by Louis is interesting, as being that of puberty: the time, certainly, in which tubercle is wont to show itself in these organs: indeed, I am convinced of the truth of the observation made several years ago by Dr. Barlow, that tubercle is developed in a particular organ according to its activity, and thus it is that the brain of infants is the most susceptible; at a later period the abdomen; and at the age of puberty, when the chest expands, the lungs are the most susceptible; and thus phthisis is comparatively rare before this period. Tubercles, I believe, are never congenital.

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[1] 1747^{60}.

[2] 1750.

[3]

[4] 1737^{25}.

Hydatid Cysts.—These may grow in the lungs as well as in other organs, but in the majority of cases where they are expectorated, the seat of the parasite is the liver; it having made its way upward through the diaphragm into the lung. Sometimes death ensues, but very often the lung and liver coalesce, and recovery takes place. In this specimen[1] you see a cyst making its way through the liver, and in this other[2] the hydatids are apparently formed in the lung.

Pigment, or Spurious Melanosis.—As a rule, the coloring matter in the lung increases in proportion to age, and thus a child's lung is comparatively white, while an old person's is of a blackish hue; consequently, all diseases at the two respective ages show a difference in color; this is especially the case in chronic inflammation of the organ, where the older the person the darker color will be the disease. The most remarkable condition, however, connected with pigment is that called spurious melanosis, or, vulgarly, black spit, occurring in those who have breathed a carbonaceous atmosphere. The fact of a black lung being found in those who had breathed a black atmosphere, at once led to the conclusion of a connection between them; but then the difficulty arose, how came it to pass? In the first place, let us inquire as to the nature of the pigment. In an ordinary lung you will find it forming dark patches in the tissue; and you know that the secretion from the bronchial tubes contains pigment. You observe in the sputum some black specks, and if you place this under the microscope, you will have a very striking object: you will see the ordinary mucous globules, with epithelium, &c., and amongst these some larger cells, various sizes, as you see in this drawing, containing numerous black particles, showing that in the secretion the coloring matter is, so to speak, organized—that is, it is contained in organic cells. In persons who work in coal-mines, and at trades where a carbonaceous atmosphere is respired, the expectoration is inordinately black; and in some cases these persons fall into a bad state of health, and die with disorganization of the lungs, called in general terms, phthisis ; but whether partaking more of the tubercular or chronic pneumonic character, I can scarcely say, but I believe the latter. Apart, however, from such disease and disorganization, the lungs in such persons may become blackened, as you see in these specimens[1] from miners of Newcastle; in these I cannot discover any change beyond the whole tissue being quite black, as if the organ had been soaked in a black fluid. In a case which came before us not long ago, of a man who had worked for many years in a gas factory, the lungs were indurated and very black, so that a quantity of dark juice came out when the part was scraped, and when placed on paper looked like Indian ink. In the same way the bronchial glands were enlarged. and converted into black masses, which could be squeezed into a paste composed almost entirely of pigment. In this lung there was considerably more than in an ordinary case of chronic pneumonia, since it stained the finger when touched. The pigmentary matter has been analysed by Christison, and found to consist of a hydro-carbon, and to be combustible like coal; and even said, on microscopic examination, to resemble coal dust; but the great difficulty is in ascertaining the direct connection between the carbon in the atmosphere and that in the lung. This difficulty in seeing how it can penetrate the tissue has caused some to think that the production of pigment was merely a secondary or accidental circumstance, seeing that it is a natural constituent of the lung, and is always produced wherever a chronic inflammation exists; and thus that the irritating quality of vicious atmosphere breathed by the miners is merely instrumental in setting up this disease. Such explanation, however, is not satisfactory, for it is especially in those who breathe a black air that this is found; and moreover, as I have just now shown you, a lung may be blackened without being diseased. Does the impurity, then, contained in the air actually pass through the air-passages into the lung tissue, and even to the bronchial glands? Such a supposition appears less improbable since the experiments made, to show that inorganic and insoluble substances like carbon, sulphur, or chalk, can pass through membranes, and may be taken up from the intestinal canal, and enter the lymphatics and mesenteric glands; and quite lately I have read (but I forget this moment where) that some observer has thought that the black matter breathed by the miners is due to an impalpable form of carbon given off by their lamps, and not to the dust of the coal; and what brought this to my remembrance is, that at the present time there is a man in the hospital who is suffering from bronchitis, with one side of chest dull, denoting probably chronic pneumonia, and the expectoration is very black; now, this man has worked for years in the vaults of the London Docks, where torches and candles are continually blazing; and this is not the only instance of the kind I have seen.

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[1] 1755^{50}.

[2] 1753.

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[1] 1726^{87}, ^{90}.

DISEASES OF THE ALIMENTARY CANAL.

MOUTH AND FAUCES.

- **Inflammatory Processes**
  - Fauces
    - Cynanche and various forms of sore throat.
    - Enlarged tonsils.
    - Diphtheria.
    - Ulceration, syphilitic, &c.
    - Pustular.
  - Mouth
    - Stomatitis follicularis.
    - „ ulcerativa.
    - „ gangrenosa.
- **Adventitious Growths** — Warts, condyloma, polypi, epulis, epithelioma.
- **Blue Lead Line on Gums.**

SALIVARY GLANDS.

PHARYNX AND ŒSOPHAGUS.

- **Malformation.**
- **Contraction.**
- **Dilatation.**
- **Wounds.**
- **Inflammation**
  - Croupous or diphtheritic.
  - From irritant substances.
- **Adventitious Growths**
  - Carcinoma; fibroid, medullary, and epithelial.
  - Cysts.
- **Gastric Solution.**
- **Foreign Bodies.**

PERITONEUM.

- INFLAMMATION..
  - Acute ....
    - General ...
    - Local ....
      - In connection with the various abdominal organs.
  - Chronic ...
    - General ...
      - Simple.
      - Tuberculous.
      - Cancerous.
      - Hæmorrhagic.
    - Local ....
      - In connection with the various organs, bands of adhesion, &c.
- ADVENTITIOUS GROWTHS ...
  - Cancer.
  - Tubercle.
  - Melanosis.
  - Colloid.
- MORBID CONTENTS ......
  - Blood.
  - Air.
  - Loose bodies.
  - Hydatids.

STOMACH.

- MALFORMATION.
- DILATATION.
- CONTRACTION.
- INJURY......
  - Displacement.
  - Wound.
- CONGESTION.
- INFLAMMATION..
  - Catarrhal gastritis.
  - Gastritis from poison.
- ULCERATION ... Simple.
- HÆMORRHAGIC EROSION.
- SOFTENING ....
  - Cadaveric.
  - Idiopathic.
- CHRONIC, INFLAMMATORY, AND DEGENERATIVE CHANGES.
- CHRONIC ULCER.
- ADVENTITIOUS GROWTHS
  - Scirrhous cancer.
  - Medullary „
  - Fibroid „
  - Colloid disease.
  - Villous „
  - Polypus.
  - Cysts.
- MORBID CONTENTS—Sarcinæ, &c.

INTESTINE.

MALFORMATION	Diverticula, &c. Malposition.	
STRANGULATION	External hernia. Internal hernia, twisting, adhesions, &c. Intussusceptio.	
INJURY	Contusions, wounds.	
CONGESTION.		
INFLAMMATION	Small	Enteritis catarrhal; Duodenitis. Diphtheritic. Typhoid. Tubercular.
	Cœcum and Appendix	Cœcitis. Concretions in appendix.
	Large	Colitis, simple or catarrhal. Diphtheritic. Dysenteric (casts). Ulceration (pigment). Stricture.
ADVENTITIOUS GROWTHS	Polypi, condylomata, hæmorrhoids. Tubercle.	
	Cancer	Medullary. Scirrhous stricture. Melanosis. Colloid. Villous.
MORBID CONTENTS	Concretions—Enterolithes. " —Accidental. Worms, &c.	
FÆCAL MATTER	Color, odor, form.	

MOUTH AND FAUCES.

MALFORMATION.—The subject of harelip and cleft palate is so important with reference to operative surgery, that I leave it; but I may show you this specimen of bifid uvula,[1] and refer you to a patient of my own, now in Stephen ward, with this peculiarity, and of which this is a drawing.

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[1] 1674^{48}.

Inflammation.—I will first speak of the affections of the back part of the throat, in which are included, also, many of the pharynx, for these parts are intimately connected in their pathology. One of the commonest diseases is simple sore throat; if this be very acute, it receives the name of *cynanche tonsillaris*, inasmuch as the violence of the inflammation is spent on the tonsils, and which often ends in suppuration. A sore throat may arise, also, from other causes, as *scarlatina;* in this form, great swelling results, which does not terminate in suppuration, but rather sloughing, although an external suppuration not infrequently happens. In ordinary cases, it has a tendency to affect the Eustachian tube and internal ear. A sore throat occurs, also, slightly in the exanthemata, fevers, erysipelas, &c. After repeated attacks of cynanche, the tonsils become permanently *enlarged*, constituting a very common and troublesome affection. You will see it among the out-patients, in the youngest infants, so that it appears, sometimes, as if congenital; in older persons, these glands are readily excised, and numerous specimens you see in this bottle;[1] they constitute almost new growths, consisting of tough fibre tissue, developed in the substance of the gland, and their surface presents this peculiar cribriform appearance from the depressions of the follicles. Occasionally, chalky secretions form in the tonsils, as you see here;[2] they are composed of phosphate of lime. Sometimes, also, the whole soft palate becomes thickened and indurated.

If suppuration be found not only in a tonsil, but at the back of the pharynx, it may have a deep-seated cause, as disease of the bone; for caries of the cervical vertebræ very frequently causes a post-pharyngeal abscess, as I have already mentioned.

Diphtherite, or Diphtheria.—This is an affection described by Bretonneau several years ago, but has only lately raged in England as a distinct form of disease, although it may probably correspond to the malignant sore throat of former times. The local peculiarity of the disease is the formation of a membrane, hence the name given to it;[3] and, in consequence, the term diphtheritic has been, of late years, used very generally for any inflammation attended by a membranous exudation like that of croup, whether seen in throat, intestine, or other part. In various diseases accompanied by sore throat, an exudation to a considerable extent may occur; but this affection appears to be altogether peculiar: a membranous pellicle is formed, which sometimes can be removed in one piece, and then represents a perfect cast of the roof of mouth and throat, leaving the part beneath livid and congested. It begins, first of all, by a redness on the throat, and soon white patches are seen here and there, until they coalesce into one membrane, covering pharynx, posterior nares, and extending into trachea and bronchi. While a doubt exists as to the nature of the affection, and what are its distinctive characters, uncertainty will also prevail as to the character of the pellicle, some being of opinion that it is a mere exudation, as is ordinarily seen on a mucous surface, while others that it is a vegetable fungus, by name the *oïdium albicans*. It is very certain that in some forms of throat affection, attended by a white pellicle, this parasite is often found, as I have now several times myself discovered; but, then, the question arises, whether these instances have exemplified the true form of the disease. It has not yet fallen to the lot of any one in London to have seen many examples of it, and to those in the country who have been visited by it as an endemic, the opportunities have scarcely offered to make the investigation; but the general belief appears to be, that the true diphtheria is attended only by an inflammatory exudation, which is slightly fibrillated, and holding epithelial cells, while the vegetable parasite has been a form of aphtha, very prevalent as an attendant on various diseases, and probably, among these, occasionally true diphtheria: it is a subject, however, still open to investigation. One peculiarity of this new throat affection is, its tendency to continue down the windpipe as true croup.

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[1] 1676^{40}.

[2] 1677^{50}.

[3] *διφθέρα*—a skin.

Ulceration.—The various forms of sore throat may go on to ulceration; cynanche often leading to small simple ulcers in the tonsils, &c. You may have observed amongst the out-patients, lately, some very severe cases of ulceration, which could be scarcely called by any other name than phagedænic; one that of a boy, where the whole soft palate was destroyed, as if by cancer; he was highly scrofulous, but whether such could be called *tuberculous ulcer*, I could scarcely say.[1] As a rule, tuberculous ulcers of the throat proceed from the larynx, and thus are unlike the syphilitic, which may attack the pharynx or larynx independently. In the former, you find the disease has commenced in the larynx in connection with phthisis, and then has spread over the glottis into the pharynx and throat. The *syphilitic ulcer* is much more common. This may affect the pharynx low down, or destroy the soft palate and creep upwards into posterior nares, or involve also the roof of mouth. When a syphilitic ulceration is examined after death, it may generally, I think, be told, for the reason I named when speaking of the larynx, by the adventitious fibrous deposit or lymph which is formed in the tissue, and thus, besides the ulceration, you find the adjacent parts much thickened and indurated.

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[1] A similar case has lately been under my care, where the ordinary tonic treatment was of no avail; but a speedy cure took place under mercurial inunction, which was considered (with other facts) sufficient evidence of the ulcer being a consequence of *congenital syphilis*.

Pustular Inflammation.—You find, as a rule, in severe cases of smallpox, that the throat is covered with pustules.

Stomatitis follicularis, or Aphthæ.—This is a well-known affection, occurring in children, and in adults towards the close of many diseases. If the white pellicle be examined, it will be often found to be composed of the mycelium and sporules of a parasitic fungus; apparently the oïdium albicans which I have already alluded to. It is not, however, quite clear how far such a parasite is a mere accident of the disease, or an essential part; but since inquiry is now directed to this matter, especially as regards diphtheria, we shall probably soon arrive at some conclusion about it. One reason for supposing that such parasite is merely accidental, is its absence in some very bad cases of throat affection, and the fact of analogous forms of growth being found between the teeth of those who do not habitually clean them, who are in perfect health, corroborates the opinion. To this last dental parasite I believe Robin gives the name *leptothrix buccalis.*

There is a form of disease which the French call *muguet*, and which, when met with in this country before the entry of the new affection of which I have been speaking, was generally styled diphtherite. The throat is covered with a white secretion, which continues down œsophagus to stomach, the trachea never being affected. A few years ago, a patient was in the hospital, where the whole mucous membrane was in a condition exactly corresponding to a plate which you will find in Cruveilhier's great work on Morbid Anatomy; in this instance the white matter on the surface consisted of a parasitic fungus, or some form of cryptogamic plant.

Stomatitis ulcerativa is a very common form of disease, and one which you see constantly among the out-patients, where ulcers may be found in various parts of the mouth, but especially along the gums. It is connected with a constitutional disturbance; and, in order that you may recognize the disease of which I speak, I may state that I make allusion to that which is so readily cured by the chlorate of potash.

Stomatitis gangrenosa, Cancrum Oris, or Noma.—This disease is one you occasionally see in the hospital; it is one which affects children, and is generally fatal. It occurs mostly after an exanthematous complaint, as measles, commencing by a slight swelling and white patch on the cheek, resembling a piece of marble; this rapidly decays, turns black, and the whole side of the cheek is mortified:[1] in some cases the disease is first perceived as an ulceration of the gum, and then it proceeds to the cheek; in a few days the whole side of the face may be destroyed, including gums; by which the tongue and pharynx are exposed, and the teeth fall out. Recovery rarely occurs; but if so, it is generally with exfoliation of parts of the jaw. I have examined several cases of the disease after death, but have failed to find any good explanation of the affection, either locally or constitutionally. The bloodvessels of the face proceeding to the part have been carefully dissected, but nothing in them has been discovered to suggest a reason why even in great constitutional debility this part of the body should be especially affected; and as regards any general cause, the same difficulty exists, since sometimes no organic disease can be found, although in two or three cases a fatty liver has been met with. If this were always so, we could scarcely tell what amount of importance should be attached to the fact, until we first knew in what time this change in the liver may occur; also to what amount the fat accumulates before any functional alteration accrues, and a condition arrived at which can be styled morbid.

Adventitious Growths.—Here are several specimens[2] of warty growths, or papillomata, from the soft palate. I have made a drawing of the microscopic appearance of a section of one of them, in which you see the papillæ composed of a dense cluster of epithelium, the cells becoming flatter and more like simple membrane or fibres the nearer they approach the centre, where you see the loops of a bloodvessel: they resemble papillary or warty growths elsewhere. Sometimes a growth on the palate is flatter, harder, and fibrous, resembling a *condyloma*, as you see in this specimen.

Polypi are mostly found growing in pharynx and upper part of œsophagus.

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[1] Wax model 29^{5}.

[2] 1784^{45}, &c.

Cancer occasionally attacks the soft palate and tonsils, as in a woman lately in Mary ward.

Epulis.—This is a term used in a very general sense, to denote growths from the gums; it would probably, however, be not applied to a well-marked cancer, and therefore it would be better to restrict the word to the fibrous and more innocent class of growths. They are of much interest, since it was in them, and in larger tumors springing from the jaw, that Lebert, in his description of fibro-plastic tumors, first figured the cells which are now called *myeloid*: many of them consist of nucleated fibres, and these peculiar cells, and are, therefore, more strictly denominated fibro-myeloid. We now give the name fibro-plastic to a growth consisting simply of nucleated fibres, and the name myeloid to a soft tumor, composed essentially of these peculiar branching cells, with their numerous nuclei. An epulis may be simply fibrous, or may be compounded of these two elements; it may be observed to recur very often after removal. It is very firm, springs from the periosteum, and is covered by gum tissue; and this specimen[1] has a few plates of bone in it, a condition not unfrequently met with: here is another, which came from a man who was said to have epulis, but which was *epithelial cancer* growing from the gum; it rapidly returned after removal.

This form of disease, *epithelioma*, you know, is very common on the lip, and in it you often see the structure to perfection; and therefore you should examine by the microscope the next specimen you meet with, when you will see the appearance I have already described. From the fact of its being so readily perceived in the lip on its first appearance, and the ease with which every part may be excised, a good opportunity is afforded of watching the general character of epithelioma. In a favorable case like this, it is seen not to return after removal, and therefore affords a proof of the local nature of this form of disease.[2]

I have already shown you a *horny* growth from the lip. Occasionally small tumors grow from the same part, having a *glandular* structure like the labial glands themselves, and this *cyst*[3] probably arose in a dilatation of one of the ducts.

I might here allude also to another morbid state, which you will do well to look for sometimes on the dead subject as well as the living; I mean the *lead line* on the gums: this you recognize as a blue or dark slate-colored rim along their edges, as seen in this

[1] 1784^{52}.

[2] 1682^{80}.

[3] 1678.

drawing.[1] If examined more closely by a lens, you perceive the coloring matter has a dotted appearance, and sometimes is in lines; this appears to be due to the vascular anatomy of the part, and the papillæ being first affected. It most commonly commences in the lower jaw.

The SALIVARY GLANDS come next in my list, but I have not many morbid specimens of these to show you. Here is a specimen of calculus[2] from the submaxillary gland, the obstruction of the duct of which you know is one cause of ranula. From the same cause in Steno's duct you may have salivary fistula, all of which affections you will hear of from the surgeon. Amongst the new growths affecting these glands is the *fibro-enchondroma of the parotid.*[3] I do not think it is clearly made out where such disease first begins, although the glands appear more or less involved. I have already alluded to this form of tumor in my first lecture.

PHARYNX AND ŒSOPHAGUS.

The affections of the throat I have already spoken of, and merely place the pharynx with the œsophagus so as to include the diseases of the upper part of this tube.

MALFORMATION.—In monsters the digestive canal may be variously altered, but in otherwise normal children, deviations have been found, as the œsophagus and aorta transposed; a case of which you will find in the *Guy's Hospital Reports.* Occasionally the œsophagus is found terminating in a *cul de sac,* or even opening into the trachea.

DILATATION.—Cases are recorded where the œsophagus has been dilated so as to form a kind of second stomach, and with this even a process of rumination has existed. In the museum of St. Thomas's there is a remarkable case of dilatation of the whole of the œsophagus. It was found accidentally after death, and unconnected with any symptoms. I have never met with a case of the kind, not even where stricture exists, for the reason, I suppose, that little or no food is taken in such cases, and the disease, which is generally cancerous, runs too rapid a course for dilatation to occur. This specimen[4] shows a *pouch* in the pharynx.

CONTRACTION or STRICTURE is a form of disease very commonly spoken of, as if the œsophagus could be strictured in the same way as the urethra. This, however, is exceedingly rare, for in the vast majority of cases where obstruction exists, it is due to disease within the tube, or to some tumor pressing from without; thus, if the cause be an organic one, a cancer of the œsophagus or aneurism of the aorta may generally be predicted. As, however, it is often certain in the living subject that such severe affections cannot exist, the term stricture must still be conventionally used in those cases where there is a mere difficulty of swallowing; remembering that it is exceedingly rare to demonstrate such a condition, for during several years' observation in the post-mortem room I have never yet met with an instance of it. We have here, however, from the museum, one or two specimens which seem to show that an ulcerative process may give rise to a cicatrization and subsequent contraction. Here is such a constriction[1] at the lower part of the pharynx where it joins the œsophagus; it is no doubt a contracted ulcer, and may be syphilitic. Here is one[2] with an ulcer of a doubtful character; and this œsophagus from a boy is a very remarkable specimen,[3] showing great thickening of the walls at its lower part; this had caused much difficulty of swallowing, and was probably due to the imbibition of some irritant fluid during infancy. The other cases I shall presently show you in connection with cancer.

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[1] Drawing 272^{15}. [2] 1784^{40}. [3] 1784^{25}. [4] 1784^{70}.

WOUNDS of pharynx and œsophagus may heal, as seen in cut throat, or as in the case of pharyngotomy you lately saw performed by Mr. Cock.

INFLAMMATION.—*Idiopathic.*—This probably is a rare form of disease, at least it is one which is not appreciable on the post-mortem table; but there can be no doubt that the œsophagus is sometimes affected in catarrh, as indicated by symptoms of gastric disturbance, as well as difficulty of swallowing. *Diphtheritic* inflammation may proceed from the pharynx into the œsophagus: this, however, I believe has not been much observed in the present new disease which is prevailing; but, as I before mentioned, the muguet of the French was noticed to pass down the tube, and I related an instance where this was the case. Most cases of inflammation arise from *irritating substances* having been swallowed, and such constitute the majority of examples we see in the hospital. The simpler form of inflammation is met with in children who have drunk boiling water; if life has been preserved for a day or two, you may find some lymph on

[1] 1784^{15}.

[2] 1789.

[3] 1789^{50}.

the surface, and at the same time the mucous membrane abraded and shreddy in parts. If death have occurred rapidly, all you will find is serous exudation into the submucous coat, whereby the walls of the tube are thicker and softer than usual, showing the first stage of inflammation. After the swallowing of poisons the mucous membrane may become indurated or destroyed. In some cases, as by sulphuric acid,[1] the membrane is converted into a dark brown or thick substance; if the fluid has passed down rapidly, the rugæ are only affected, and the membrane may have been destroyed and loosened in patches.

In this specimen[2] you see some *pieces of membrane* which were said to have been vomited by a young person, a patient of Dr. Bird. They appear to correspond to the œsophagus, but whether the mucous membrane or an adventitious substance from it, I cannot positively say; but probably the latter, as a cropous exudation.

You will see on our shelves two or three specimens showing an *opening between œsophagus and trachea,* the remarkable feature of which is, that the aperture is circumscribed, and has no adventitious matter around it to indicate its nature; the disease not appearing cancerous, nor is there evidence of suppuration, no more being seen than a simple ulcerative process.

MORBID GROWTHS.—The most common is cancer. The harder *scirrhous* form of the disease is rare, but this specimen[3] of stricture, with much thickening of the walls, appears to constitute an example of the disease. A less rare form, although not very common, is the *medullary,* as in this specimen, where you see a large encephaloid tumor growing in the œsophagus.[4] The ordinary form of cancer, however, is the *epithelial,* and this is very common. In the upper part or pharynx it may appear as a distinct circumscribed growth or tumor, as you see here.[5] In most cases, however, it involves the surface of the tube, and then softening down, a large cancerous ulcer is the result. Occasionally a great extent of the mucous surface may be affected, and the disease reaches quite into the pharynx, as you see here,[6] where the growth has a warty appearance, and in this,[7] where nearly the whole length of the tube is occupied by the disease in its sloughing stage. This preparation shows the pharynx destroyed by cancerous ulceration.[8] The most common form of cancer of the œsophagus is the epithelial, circumscribed or confined to a given part; this being most frequent nearly opposite the bifurcation of the trachea, as you see here,[1] where the windpipe is opened. The disease is quite local, the œsophagus and neighbouring lymphatic glands being the parts alone affected, except in quite exceptional cases, where the lung may be slightly implicated; in one case, where the disease was very extensive, the edge of liver and supra-renal capsules were involved, but in these organs the epithelial structures were very imperfectly formed. In most cases, I say, you find the disease situated at about the middle of the œsophagus, as a circumscribed long cancerous ulcer; the edges above and below are raised, so that the mucous membrane beyond is quite healthy; it has generally extended to the whole circumference of the canal, but may, in some instances, be more on one side than the other; as a rule, we find the destructive process has advanced more on the anterior than the posterior, for while the tube is rarely torn open on removing it from the spine, we find the front wall quite destroyed, and communicating often with the windpipe, lungs, and other parts: this position of the cancer may be accidental, owing to the less pressure in front during its growth. The surface is found sloughing, of a dark greenish color, and very fetid; sometimes portions of dead tissue are lying loose upon it; on making a section quite through it, the adventitious tissue is seen beneath, and forming, sometimes, the sole continuation of the tube between the healthy parts. The extent of the disease is generally about three or four inches in length, it pervades the neighbouring glands, which are enlarged by the cancer; the pneumogastric nerves are involved, or sometimes quite destroyed. The bronchial tubes are often perforated, and the roots of the lungs in a state of pneumonia and sloughing; the remainder of the lung being often recently inflamed, which is the immediate cause of death. In this specimen[2] you see the lungs involved, and in this one the pericardium has been entered.[3] The last case we saw in the post-mortem room was remarkable in the disease being so local; the very lowest part of the œsophagus as it joins the stomach was occupied by a small cancerous nodule, which was sufficient to obstruct the tube and cause death. Extensive cancerous ulcerations in the upper part of the canal sometimes are fatal by hæmorrhage.

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[1] 1786, &c. [2] 1787^{50}. [3] 1789^{60}. [4] 1792^{60}. [5] 1785^{76}. [6] 1793^{20}.
[7] 1793^{35}. [8] 1785^{35}.

Polypus.—The tumor I just now showed you in the pharynx might be called a polypus, were it not cancerous; the former term generally being used for the simpler form of fibrous or fibro-cellular growth, such as is met with in the nose or uterus, and which is occasionally seen in pharynx or œsophagus.

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[1] 1793^{b}, and drawing 283^{a}.

[2] 1792^{40}.

[3] 1793^{33}.

Warty Growths on Œsophagus.—Sometimes these occur resembling warts on other parts, but more usually they consist of white flat patches, slightly raised above the surface of the mucous membrane. They consist merely of an increased growth of epithelium, and thus resemble the corns on the inside of the hand. I have met with two such cases lately.[1]

Cyst in œsophagus is shown in this specimen; it did not produce any symptoms. It is formed in the walls, and contains a thick mucoid fluid.

Digestive Solution.—I shall presently show you specimens of stomach dissolved by the gastric juice; and the same sometimes occurs in the œsophagus, when the contents may escape into the pleural cavity, as I have already mentioned. You see here[2] an œsophagus partially dissolved by the gastric juice; in a less degree you see merely the longitudinal rugæ removed or hanging in shreds. While the body is supine, the gastric contents may pass upwards into the œsophagus; and this is important to remember, for if these contents proceed into the pharynx, and then down the trachea into the bronchi, which often occurs, you might be somewhat puzzled to find such unusual matters in the lungs.

Foreign Bodies.—In this œsophagus[3] you see a large piece of pudding impacted. This killed the child, who was dead when brought to the hospital. Of late we have heard of several instances where death has been caused by the impaction of false teeth in the œsophagus.

PERITONEUM.

Acute Inflammation.—This is characterized by the same appearances as are met with in other serous membranes already described, which, however, are seen in greater perfection in the peritoneum. Thus, after a few hours of inflammation, the membrane will be found highly vascular, or in a hyperæmic condition, and, at the same time, distended, as if it had lost its ordinary contractile power, and at a later period an exudation of lymph will be poured out upon it. This is often excessive, and is seen in large flakes covering all parts of the surface; at an earlier period however, you must look for lesser signs of inflammation: thus the exudation may be so slight that it is only by scraping with a scalpel that the lymph becomes perceptible, though the greasy feel imparted to the finger is sufficient to detect it; the inflammation will be found more excessive at those parts of the membrane which touch one another, and thus the coils of intestine are seen to be highly vascular where they come in contact, and when separated a long line of a bright red color is seen passing down their surface. At this line also the exudation is first thrown out, and thus the coils very soon become adherent. As I before told you, the fluids which are poured from the vessels in inflammation are not only from the free surface, but into the membrane itself, and thus the tissue becomes softened; you will find, on examining a case of acute peritonitis, how very readily the intestines are torn; and if you take a portion, and gently excise the peritoneal coat all around, you will be able easily to separate it from the muscular layer beneath: this softness of an inflamed organ is important to remember, as I told you, especially in reference to the lungs. The exudation may vary in kind: in acute sthenic peritonitis it is *solid lymph*, and is found covering the intestines and the abdominal parietes, and forming a layer over the liver and other organs. In other cases it is asthenic, and the exudation is *purulent*, when none of the signs are so well marked as I have mentioned, but a quantity of milky fluid is found in the abdomen, particularly in the depending parts, as the pelvis. Between these two extremes of solid and fluid there are many intermediate conditions; thus two coils of intestine may be found adherent by lymph, but when separated some fluid may be found to have collected between them.

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[1] 1784^{77}.

[2] 1793^{80}, and drawing 283^{25}.

[3] 1793^{40}.

Not only does the inflammation vary in character, but also in extent: if the whole abdomen is affected, and the inflammatory effusion extends from the diaphragm above to the pelvis below, the case is generally fatal; but when the inflammation is merely local, it may be recovered from, or does not immediately cause death, and therefore generally this form is seen in the chronic state.

In a case of fatal peritonitis you should always at once proceed to look for the cause of it; and which will be found, in most instances, due to a previous disease of some organ which the membrane covers. You know the peritoneum either wholly or partially envelops the various organs in the abdomen, and therefore if disease be progressing in these parts for any time, and the peritoneum become involved, an inflammation ensues. The disease of the viscus may be of that slow character that when the peritoneum is reached it is only locally affected, and, a small amount of lymph being effused, the resulting inflammation is confined to that spot. We thus find the liver adherent to diaphragm, and sometimes circumscribing an abscess; occasionally also an abscess on left side, which has resulted from disease of its neighbouring organs, as, perhaps, a perforation of the stomach; also coils of intestines containing an abscess amongst them, or in the pelvis a local inflammation with similar results. If, however, an organ should suddenly rupture, and some of its natural secretions or other irritant fluid be poured out, generally a universal and fatal peritonitis is set up. Thus abscess or hydatid in the liver, perforating ulcer of the stomach, perforating ulcer of the intestine (which is generally of the typhoid kind), ulcerations from old-standing organic disease of the intestine, escape of intestinal calculi from the cœcal appendix, or any extraneous body which may have lodged there:—all these are common causes. Less frequently escape of gall-stones through the ducts, rupture of ovaries, and various diseases of genital organs; and cases are related of its occurrence from worms perforating the bowels. Owing to the various local diseases, suppuration may continue a long time behind the peritoneum without inflammation following, though a peritonitis may at last ensue. Suppuration of kidneys very rarely penetrates the serous coat, and pelvic cellulitis may long continue without the peritoneum becoming involved. The extent or even presence of inflammation depends often upon the nature of the irritant which first sets it up; thus urine is one of the most irritating of fluids, and when its extravasation occurs into the cellular tissue, death often speedily follows: the peritoneum may even become involved without any free urine having escaped into it, as is sometimes seen after the operation of lithotomy, where an inflammation around the bladder from such a cause has lit up the same disease in the peritoneum. Of course the same results follow if an organ be ruptured by violence; this is especially the case when the secretion or contents of the organ be extravasated, as bile, urine, or food, and fæcal matter from stomach and intestine; but it is remarkable that blood does not cause it: a large effusion of this fluid may be fatal at once; but if the organ from which it proceeds be not mortally injured, the blood does not cause inflamis this which so often renders the disease obscure, and its diagnosis difficult, during life. The main symptom generally being ascites (and necessitating tapping), it is only in the absence of other causes for the dropsy that a suspicion is created as to its nature. It is a form of disease frequent enough, though not much described, but always pointed out by Dr. Addison in his lectures. On opening the abdomen, a quantity of serum is found, and the peritoneum is seen covered with a number of hard tubercles, the omentum infiltrated with the same products, and the mesentery hardened and contracted. The thickening of the latter parts is often very remarkable, forming solid masses an inch or two thick, and the omentum drawn up to the colon, forming a hard ridge beneath it. Hard nodules are sprinkled over the intestines and abdominal walls, which, on microscopic examination, are found to consist of fibres and cells, and might be styled fibrous cancer; the disease is called peritonitis because of the thickening and contraction of the serous membrane showing that a chronic inflammation has been going on.[1] It is thus analogous to tubercular disease of the peritoneum and other organs, where, as in the lungs, not only is there present an adventitious deposit, but a chronic inflammatory process; and, as in such cases it is still a question how far the deposit is necessarily antecedent to the other changes, so in the present instance the same difficulty occurs. There can be no doubt, however, that in all such instances the process is one, in great measure, of chronic inflammation, but peculiar, owing to constitutional circumstances; and, in the present case, putting on a cancerous form, as it does tuberculous in others. The peritoneal surface of the liver may also be white, and covered with cancerous nodules. There is generally some enlargement of mesenteric and lumbar glands, but not to any great extent, and thus the disease is confined to the peritoneum. The ascites is evidently due to the constriction of portal veins.

Hæmorrhagic Peritonitis.—I have already spoken of blood being found mixed with the inflammatory exudations in pericarditis and pleuritis, and now you must notice that the same sometimes occurs in the peritoneum. On first opening the abdomen you are struck by the effused blood covering the intestines and other parts; but on closer examination you discover that it is merely lymph colored by blood, in the same way as before mentioned under the pleura, and having the same origin.

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[1] 2470, 2470^{21}, &c., and drawings 456^{60} and 461^{50}.

Local Peritonitis.—This is very common in the same way as pleuritic adhesions, but attended often with more serious consequences.[1] Local adhesions are constantly met with, and in many parts are of no importance, as for instance when between the liver and the diaphragm. Such bands of adhesion, however, may by constricting the intestines give rise to fatal results, as you see in some of these specimens;[2] a band of adhesion may pass down to a portion of bowel and directly constrict it, or may be united to some other part, producing a hole through which a coil of bowel may fall; or, as not uncommonly happens, the cœcal appendix becomes adherent, and forms a loop through which intestine may pass.[3] As regards other organs, the chronic local inflammation may result in important effects, as adhesions of Fallopian tubes, ovaries, &c.; but it is especially in the upper part of abdomen that these are the most important. I have already alluded to chronic ulcer of stomach, causing adhesions to the liver and other neighbouring parts; but a slow inflammation of surface of liver may include its capsule, and also the cellular tissue in which its vessels and ducts pass, and thus is produced one form of fatal jaundice; or indeed this may be one cause of cirrhosis. You may often find in fatal jaundice, a union of the several organs about the region of the gall-bladder, as the colon, duodenum, and gall-bladder with ducts, all firmly united by dense fibrous tissue; on cutting them apart, a chronic local inflammation is seen to have occurred, and the cause of all is probably a gall-stone which may be found in the bladder or ducts. This peritoneal inflammation, also, often involves the surface of the pancreas, which becomes, in consequence, much hardened. I am only speaking now of a simple inflammatory process, but in some such cases cancer also coexists. It would seem sometimes, also, as if cirrhosis or contraction of the liver, with its accompanying ascites, might arise from a local peritoneal inflammation, which, first involving its investing membrane, should affect the neighbouring Glisson's capsule, and so the whole liver from without.

ADVENTITIOUS PRODUCTS.—*Cancer* may occur in various parts of the abdomen, and thus involve the peritoneum; but when this membrane is primarily affected, the chronic inflammatory change is mostly found with it, as has already been described. Very often however, in cases of cancer elsewhere, it may be found in the peritoneum; and when medullary and soft, it may in its growth involve many important parts.

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[1] 2439^{50}, 2440.

[2] 2444, 2444^{50}.

[3] 2508.

Tubercle.—The same remarks apply to tubercle; it may be often found in peritoneum in cases of general tuberculosis, but its importance is, when an inflammatory process accompanies it as already described.

Melanosis I have seen in a few instances where other parts of the body were affected.[1]

Colloid.—This is a disease almost peculiar to the abdomen. It may be found elsewhere, but generally in the neighbourhood of the stomach, colon, and omentum. In the slighter cases it occurs merely within the walls of the stomach, as will be mentioned under that organ, but often other parts of the abdomen are involved—its favorite seat appearing to be the serous membrane. Thus the peritoneum may sometimes be found covered with these gelatinous masses growing from its surface, and the omentum immensely thickened, and converted into a long, flattened, hard tumor.[2] A section of this would show the interior to be white, and having somewhat of a honeycomb appearance, consisting of a fibrous network containing the colloid matter within it. Sometimes this has formed in such large quantities, that when the abdomen is opened several pints of it have poured out. In these cases its seat appears to be the subserous coat, and thus involves the peritoneum, and the walls of the hollow organs, as the stomach. In this beautiful and rare specimen, the liver is involved in the disease. When examined, you find it composed of a network of delicate membrane, somewhat like the tissue of the lung, only finer and softer, and the spaces larger. In these spaces or loculi, the white transparent gum-like colloid matter is contained. The microscope shows cells or nuclei in its midst, and if a portion of the closer structure be taken, the spaces may be found filled with clusters of cells.

Morbid Contents.—*Blood.*—This is constantly found in the abdomen as result of rupture of aneurism, or injury to liver, spleen, &c., and may be mixed, as I have just said, with inflammatory lymph. Where the amount of blood effused has not been sufficient to cause death, no peritonitis follows, but various changes take place in the blood; the fluid matter is absorbed, the fibrinous part is applied to the serous membrane, and the coloring matter becomes of a darker color.[3] The same, no doubt, occurs in some other parts as the lung, but in the brain it becomes lighter. On the intestine, however, it appears to become very dark, and in time almost black; at least in the two or three instances where probably blood had been effused, this has been the case. In rupture of liver and spleen, if veins be opened, the blood is portal, and of a pitchy character.

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[1] Drawing, 463^{5}.

[2] 1813^{30}.

[3] 2434^{77,91}.

A *black pigment* is constantly met with in the peritoneum, and if so, generally with some evidence of a former peritonitis; and as in inflammation some blood is often found effused with the lymph, it is probable that in these cases the source of the coloring matter is hæmatine.[1] Occasionally the intestines are found uniformly black, at other times, spotted. It was thought, in one case, that this was associated with the melasma supra-renale,[2] but the observation has not been substantiated; it does, however, occur in connection with the deposition of pigment in other parts.

Air.—I have already alluded to the subject of air in the serous cavities as a result of secretion or decomposition. I have never seen it in the pleura, unless with clear evidence of its entry from without, and never an undoubted instance of it in the pericardium. In the peritoneum it is frequently found after perforation of the intestine, when the gas has clearly escaped into the cavity. In one case, which occurred here about a year ago, it was evident that gas had existed in the abdomen for two or three weeks before death. The abdomen fluctuated, showing fluid, but at the same time was boggy and tympanitic, and on shaking the patient a splash was heard. On post-mortem examination, a similar sound was heard on succussion; and on cutting through the walls a gush of air came out, the intestines were found contracted at the posterior part, and covered with lymph in which blood was mingled, as just now described. It was not satisfactorily made out whence was the source of the air, whether a decomposition of the blood and other products of effusion, or whether there had been an escape from the intestine; it is very likely that the latter was the cause, though, from the subsequent matting together of the intestine, it was impossible to be made out.

I have seen two cases where *chyle* was found in the abdominal cavity from obstruction of thoracic or lacteal ducts. One of these cases you will find recorded in our *Reports*.

Loose Bodies.—These may be of various kinds, as *biliary* or *intestinal calculi*, which may have escaped from their respective canals;

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[1] 2164^{10}.

[2] Drawing 460^{5}.

I believe also a loose *uterine tumor* has been found, and this I can well believe, from a case I once saw where a large tumor hung by the thinnest possible pedicle. In most instances, however, the loose bodies are small and of a definite character, and have, no doubt, one source. They are oval or round and flattened, resembling a bean,[1] enclosed in a capsule, and within composed of fibrous tissue and fat. You will see several specimens in these bottles, some loose and others attached. Some of these were lately taken by Dr. Burton Brown from bodies in the dissecting-room, and some you see in course of development in the appendices epiploicæ; in fact, these latter processes become altered in structure and then drop off, constituting these loose tumors. One such body is described by a surgeon as being found in a hernial sac when he proceeded to operate. Occasionally, perhaps, they may have another source, as the liver, where sometimes small cysts of doubtful character may be met with on the edge of the organ.

Hydatids are sometimes found loose in the abdomen, but not so frequently as in the liver, and are generally associated with them in this organ. It is thus thought that their origin may, in most cases, be the liver; for when developed in this organ they sometimes protrude from the surface, and become at last almost detached, and in these cases others may be found growing around them. They may be found in large number in the cavity of the abdomen, loose or connected by cellular filaments with the omentum or other parts. You will see in these several specimens, hydatids attached to mesentery,[2] colon,[3] and broad ligament of uterus.[4]

STOMACH.

Dilatation.—This is generally a secondary affection, and is seen especially in cases of obstruction of the pyloric end. For the same reason that the stomach contracts when little food enters from disease of the cardiac end, so it dilates in cases of scirrhous pylorus. Thus you may remember that in the last case of this affection which we examined, we found on opening the abdomen that it was the only organ seen, being immensely distended and reaching to the pelvis; and you may sometimes observe in the living subject the outline of the stomach thus distended from the great accumulation of fluid within it. Here is a drawing of such distention, but whether from scirrhous pylorus it does not state.[1]

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[1] 2441, and various others showing process of formation.

[2] 2472^{50}.

[3] 2473^{50}.

[4] 2474.

CONTRACTION.—When little food enters the stomach from disease at the œsophageal end, it shrinks, and the same may occur if little food be taken from other causes. In this drawing you see a remarkably small stomach, which appears to be due to a contraction of a large ulcer within it.[2] A similar state, too, may sometimes be seen where cancer is diffused through the coats. In these two preparation-bottles you will see stomachs in the state styled hourglass contraction.[3] You see both organs appear as if a ligature had been passed around their middle and dividing them into two portions; in one the peritoneal coat is thickened, which, I have no doubt, denotes the site of a healed chronic ulcer; at least this was the case in the two or three examples I have met with on the dead body. I do not know of any cause except the cicatrization of an ulcer to produce such a result.

INJURY.—Wounds of the stomach leading to evacuation of its contents are generally fatal. Remarkable exceptional cases, however, occur, where the wound becomes adherent to the abdominal walls, and closes; and also where the edges unite and a permanent fistula remains, as in the well-known case of Alexis and a few other recorded examples. Most of you saw a man lately in the hospital, in whom there was little doubt that the stomach had been wounded by the stab of a knife, and yet he recovered; also a similar one which occurred at the same time elsewhere, in which it was almost certain that the stomach had been opened. In all the cases where the organ has been opened by the surgeon to introduce nourishment, death has soon taken place. In this specimen[4] you see a partial laceration of the coats of the stomach, the mucous membrane is detached and lacerated, a long rent being seen on its inner surface. It came from a boy who was run over. We have also on our shelves a stomach with a rent, which is supposed to have occurred during the act of vomiting; but this, I think, is very doubtful, as I am not aware that any similar instance is recorded. The stomach may be misplaced after rupture of the diaphragm, producing *diaphragmatic hernia*. This can only occur on the left side, when the organ with some of the intestines may escape into the chest.[5] In some instances, where there has been no history of accident, it has been thought that it might have arisen from disease; and in one case, as you see in this specimen, the misplacement was congenital.[1]

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[1] 283^{70}. [2] 296^{20}, and prep. 1806^{60}. [3] 1795 and 1796. [4] 1817^{25}.

[5] See *Lancet* for Oct. 23rd, 1858, where I have recorded three cases, to show that *excessive thirst* was the most prominent symptom observed.

CONGESTION.—I do not know any more important morbid condition of the stomach worthy of notice than congestion, for it is only by a proper knowledge of this and similar states that you will be able to recognize the results of poisoning by irritant substances; and even by long observation you will find it very difficult to pronounce in any case whether the organ be inflamed or not, seeing that the ordinary post-mortem appearances are so varied, according to the modes of death and conditions of the organ, as regards the presence of food. What makes the difficulty greater is, that congestion and inflammation pass into one another, and that the latter is probably more often present than usually believed. The example I particularly wish to bring before you is the stomach in heart disease, and which I am constantly showing you in the post-mortem room. If the cardiac affection be of that kind to cause great congestion of the body, the mucous membrane of stomach is affected in common with other structures, and consequently presents a very remarkable appearance, and one which more often has the signs of acute inflammation than some which are so designated after the introduction of a poison. The interior is of a dark red or purple throughout, and on close examination this is found to be due to a hyperæmic state of the vessels, or true capillary injection; and, besides this, there is a large mucous secretion from the interior of the stomach, the whole being sometimes found covered with mucus of so tenacious a character that a strong stream of water is barely sufficient to wash it off; there is also sometimes some effusion in the mucous membrane itself, and in submucous tissue, and then the whole coats appear thickened, and the organ feels fleshy and heavy instead of membranous: when you remember the epigastric pain, sickness, &c., sometimes attending heart disease, and then look upon such a condition as this which is found after death, there can be little doubt that this extreme congestion has actually passed into an inflammation; the ulceration which is sometimes found in conjunction with it I will presently mention. This cardiac stomach approaches much more nearly to an inflammation than many cases where an irritant poison has been swallowed; indeed I have never seen any case of the latter which at all equalled it, and, therefore, I should warn you not to pronounce too hastily that a poison has been taken, even should any amount of redness or mucous secretion be met with; for I myself have never yet met with a case where any such condition could have warranted the suggestion of poison unless the fact had been previously known; indeed I believe it is only where an *ulceration* or change of structure has been produced that you can speak with certainty in this respect.

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[1] 2507.

GASTRITIS, SIMPLE OR CATARRHAL.—It is remarkable how opinions have varied, and do still, with reference to the existence or frequency of gastritis. Formerly, when morbid anatomy was less cultivated, the various symptoms denoting severe stomach derangements were attributed to inflammation, and gastritis was one of the recognized disorders. Subsequently, however, when the viscera were more examined, and some tangible or very visible alterations were required to prove the existence of a morbid process, gastritis came into disrepute, and some eminent pathologists have denied altogether the existence of such a disease; failing, more especially, to find alterations in the stomachs of drunkards, and others, where inflammations had been thought so often to occur. It is probable, however, that this opinion was due to the absence of suppuration, and such well-marked results of inflammation, and the non-recognition of minute changes in the mucous membrane. There can be little doubt, however, of the fact of gastritis being a frequent affection. Thus the cardiac stomach already mentioned, shows a *subacute inflammation*, as evidenced by the hyperæmic condition of the bloodvessels and mucous secretion; and if this be so, such a state, though less marked, may be often met with in other forms of disease, as in morbus Brightii, &c.; and in cases of Addison's disease, where great irritability of stomach has existed, some evidence of a gastritis has also been present. If we notice the symptoms attending such cases as these, and we meet with similar instances again, we cannot do otherwise than suppose an inflammation is present. The frequency of stomach derangement in common catarrh, where the bronchi are thought to be the parts only involved, would suggest it as a not uncommon complaint; I would, therefore, advise you always to examine the stomach, and become well acquainted with its morbid appearances. You can see also, by this drawing, how dark the stomach may become by mere congestion.[1]

Gastritis from Irritant Poison.—I know nothing less than an actual breach of surface, or some chemical change in the tissue, which can decide you in declaring that a stomach has been affected by an irritant, especially since the hyperæmic state found in heart disease is believed, only with some hesitation, to have passed beyond the stage of congestion. In the case of strong acids or alkalis, a chemical change occurs in the mucous membrane, and a dark brown mass results; you will see how in many of these examples the poison was never carried round the stomach, or else it had become so diluted that its effects were lost; and thus you see only the spot where it first struck the inside on entering, this being about the middle of the greater curvature, opposite the œsophagus; thus often only the pyloric half of the organ is affected.[1] In this stomach of a child, who died from swallowing some soap-lees,[2] you see the œsophagus is of a brown color throughout, and that there are one or two brown spots on the membrane; in cases of poisoning by sulphuric acid, the parts with which it comes in contact are blackened,[3] and hardened into a thick mass; and in some cases the acid perforates the stomach[4] and involves the neighbouring organs, which are all charred. In this case,[5] where the woman lived several days after drinking diluted sulphuric acid, the whole mucous membrane was found lying loose within the stomach, and of a bright yellow color. In cases of poisoning by arsenic, the inflammation may be slight; thus in one of the last cases occurring here, where death took place after ten hours, the inflammation was only characterized by the red color and injection of bloodvessels, there being no ecchymosis, extravasation, nor any ulceration. In this specimen[6] you see a patch coated with mucus and the poison, where a circumscribed intense inflammation had occurred. In another case of a young man who survived six days, numerous ulcers were found. Various other conditions you will see in our preparations and drawings. The effects of a chronic inflammation and ulceration, leading to a perforation, is seen in this specimen[7] of a stomach affected by chloride of zinc. The woman, who was a patient of mine, drank some Burnet's solution, and survived twelve weeks. The organ is exceedingly contracted, ulcerated, and leading by an opening to an abscess at the cardiac end. In poisoning by vegetable irritants, the appearances of the mucous membrane of the stomach are very slight and fallacious, especially when it is remembered that so many of these substances act on the nervous

[1] 1799^{33}. [2] 1798^{20}. [3] 1799^{25}. [4] 1799^{32}. [5] 1799^{30}. [6] 1798^{50}. [7] 1799^{35}.

system to produce asphyxia, or difficulty of respiration, which tends to congestion of all parts, including the stomach. Thus in a case I lately witnessed, where the mucous membrane was of an intense red color, all the organs participated in the congestion from the mode of death. In a case of poisoning by bitter almonds, which occurred here a short time ago, the mucous membrane was of a bright pink color from vascular injection, and which must be looked upon as the first stage of an inflammatory condition; even this, however, might have been overlooked, had not the history been known.

Ulceration, Simple.—This, as an effect of inflammation, is not so common as might be thought; ulceration being generally cancerous, or of that equally characteristic kind known as the chronic. It may occur, however, from the effects of poison, as we have seen, and sometimes may arise as a general minute ulceration in connection with many diseases a short time before death; these, indeed, are almost the only circumstances under which we find a simple form of disease, for idiopathic ulceration of a similar character, resembling that found lower down in the alimentary canal, is almost unknown; and even in the case I mention it is often a question how much may be due to a post-mortem change. Such a specimen is here, where minute ulcerations are seen on the stomach.[1]

HÆMORRHAGIC EROSION.—This is a name given to an appearance of the stomach met with in those remarkably congested organs found in heart disease of which I have already made mention; besides the extreme congestion, the mucous membrane is found destroyed in various spots, and occupying each of these is a layer of black coagulated blood. It seems doubtful whether the whole may not take place after death; that in those spots where the blood is just starting from the capallaries, a post-mortem solution occurs, and lays open this submucous tissue; though it may be that the ulcerations happens in the dying hours, and thus minute coagulations take place in them. You recognize them in the darkly congested stomach, by seeing small black patches, which, on closer examination, are found to be coagulated blood, occupying spots where the mucous membrane is deficient.

It is possible that the changes which have occurred in small effusions of blood, have given rise to the *pigmental spots* occasionally seen[2] on the mucous membrane.

SOFTENING, CADAVERIC.—As in describing many of the morbid appearances of the stomach, I have referred to post-mortem changes, it would be more convenient to speak next on this subject; and I must again impress you with the importance of studying these changes, since they are much more striking than many appearances which may be due to disease. You know that the gastric juice after death acts on the coats of the stomach to dissolve them in the same way as it does on its own contents; it has generally been thought that the juice maintained its integrity, while the stomach itself lost its vitality, and thus became subject to the influence of the former. Bernard, however, has shown (and you have seen Dr. Pavy repeat the experiments) that the solvent power of the gastric juice is equally great on living tissues, and that the reason why the stomach is not affected during life, is due to the constant evolution of mucus and epithelium which protect it; after death this mucus is decomposed, and the gastric juice, then arriving at the wall of the stomach, dissolves it. As the juice appears to be secreted only by the stimulus of food, if the patient die with an empty stomach, it may be found several days after death unaltered, with the mucous membrane entire, and the rugæ prominent and unchanged.

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[1] 1802^{72}, ^{75}.

[2] Drawing 300.

If, however, there be food in the organ, and the digestive process going on, then the mucous membrane will be found to have undergone solution, and, in some cases, even all the coats destroyed, leading to perforation. The part and amount of stomach affected corresponds to the quantity of food within it, and also upon the position of the body after death. As this is always supine, it is the larger end of the stomach and its posterior part which is acted upon; and if the contents be removed, you can see by the change which has occurred to what height the food reached, the water-mark being accurately defined by a distinct margin: above this, or that part which includes the anterior and pyloric end of stomach, the natural rugæ of the membrane are seen. In the most depending part which has held the food, all the coats of the stomach may be dissolved; this, however, is not usual: what is mostly seen is a loss of mucous membrane, submucous tissue exposed, and external coats softened, or a softening and thinning of all the coats. The affected part differs from the other, not only in thinness of coats, but in being smooth from the loss of the rugæ; it also presents a very characteristic appearance, which is resembled by no pathological state, from the action of the gastric juice on the blood and vessels. You know that the gastric acid renders the blood black, and thus, when the sub-mucous tissue is laid open, the vessels are seen coursing along, of a black color; but the blood is not confined to the limits of the vessel, for exudation has occurred through their walls, and thus you see an irregular branching, or arborescent appearance of black lines running over the dissolved part. This you see in this preparation and drawing;[1] the latter showing admirably the process of digestive solution. In some cases perforation occurs from digestion of all the coats, and the contents of the stomach are found in the abdomen; I have already alluded to such a circumstance occurring in the œsophagus, and escape of contents into chest, and occasionally the duodenum may equally suffer.[2] Such a perforation is easily distinguished from a morbid process, both by its position and character; it will be found at the cardiac end in the midst of a portion of stomach undergoing solution, a region not usual for an ulcer; and again, the latter being an inflammatory process, the edges will be found thickened from lymph, fibroid tissue, &c.; while in the softening the opening is large, the edges thin, ragged, and hanging in shreds, presenting just the appearance you would imagine if the end of the stomach had been dissolved in an acid.[3] It is not often that we meet with this extreme solution, and it is not clear what are all the circumstances necessary for its production. There can be no doubt that a healthy digestive process in operation just before death is the most favorable for it, and thus it is that animals killed with food in their stomachs are so often found to have the organ dissolved; and for the same reason it is, that in persons who have died suddenly during digestion, the stomach is most affected. Constantly, however, as we are meeting with persons dying under these circumstances, it has not been in them that *perforation* has been met with, for during the last year the only two cases observed were, one in a child who died of brain disease, and another in a lad, of alluminuria. It has been thought that the ordinary processes of decomposition have had their share in its production; but this does not seem so, for now and then it falls to our lot to examine bodies frightfully decomposed, but in none such have I found perforation. It has been thought, too, that the warm weather has influenced it; but this notion has arisen probably from the supposition that decomposition is more rapid in warm weather than cold, which is by no means the case; the condition of atmosphere which most favors decomposition is moisture, and thus a moist cold day in winter is more favorable to the general disintegration of the body, than a warm dry day in summer. This I have observed on repeated occasions. Time, too, is not the most important element in the process, for bodies are occasionally disinterred after two or three weeks' burial, and yet only the usual processes of decomposition have occurred. It is clearly necessary that the stomach should have preserved, in great measure, its integrity, so that digestion may be going on naturally at time of death, and for this, no doubt, warmth is necessary; but then it is manifest some other cause must be in operation to determine it in one case more than another; and this may be due, perhaps, to the removal of some nervous power from the part, owing to the mode of death; this, however, has yet to be proved.

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[1] 1802^{12}, and drawing 303^{13}, ^{25}, &c.

[2] 1817^{25}.

[3] 1802^{24}; and showing half of stomach dissolved, 1802^{15}.

IDIOPATHIC SOFTENING.—I mention this in connection with post-mortem solution, because it is stated by some writers to be a frequent pathological condition in children. It is styled gelatiniform softening of the stomach, and described by some continental authors as productive of certain symptoms, and leading to a fatal issue; perhaps it is not right to doubt any facts well observed by those whose experience in children's hospitals give them so favorable an opportunity for making such researches; but I must confess my own ignorance of the morbid state mentioned, from the examination of a few cases in dispensary practice, where vomiting and other symptoms denoting gastric disturbance were present; but yet the stomach, I think, presented no greater degree of softening than the natural texture of a child's tissues, combined with a post-mortem digestive process, would account for. This is also a subject well worthy of further consideration.

CHRONIC, INFLAMMATORY, *and other Changes in the Stomach.*—I just now said that the first study of morbid anatomy tended rather to the denial of such a disease as gastritis, but we have seen that in all probability it is not uncommon; and if we proceed to more minute changes, and to such as those which are discernible only by the microscope, there can be no doubt that numerous morbid processes allied to those which pass by the name chronic inflammatory elsewhere, are equally present here: it is questionable, however, whether those manifest changes, such as the formation of a fibrous material, is present in any quantities to produce a general thickening of the coats, such as was formerly supposed to occur in drunkards.

Here are two such stomachs[1] about which there was this history, and the coats were thickened; but I have not examined the nature of the adventitious material. I might here show you this remarkable stomach of the knife-eater,[2] the sailor who had been in the habit of swallowing a large number of knives; the organ, you see, is distended, and its walls thickened. The chronic changes which are undergone in the mucous membrane and its follicles, have been especially studied by Dr. Habershon and Dr. Handfield Jones, and for their views I may refer you to the last volume of the *Guy's Hospital Reports*. Some of the most striking of the changes which they mention, and which I myself have witnessed, have been in the *fatty degeneration of the follicles;* instead of finding the natural epithelium, the tubules are opaque, and occupied by fatty granules. Again, in chronic inflammation it is said that an increase of *fibrous tissue* may be discovered between the tubules when a section is made of the membrane. It is thought that an increase of this contractile tissue may give rise to that condition of the stomach called *mammellated*.[3] This you constantly see in the post-mortem room, and I have a specimen in this bottle; instead of the mucous membrane being smooth, it is covered with a number of minute projections lying close together as if the contraction of the submucous tissue had drawn the mucous membrane into this form. This is probably the cause, for I think it is not yet satisfactorily proved that it is due to adventitious structure, or is really morbid—at least not more so than the analogous case of the *cutis anserina*. In the more acute inflammations of the stomach already spoken of, the microscope may also be employed to investigate the changes in the follicles, secretion, &c.

Chronic Ulcer.—This is a very common form of disease in the stomach, and is called sometimes the perforating ulcer. It is situated in the majority of cases in the lesser curvature, and perhaps rather nearer the pyloric than the cardiac end, and has the pancreas for its base: it may vary from the most minute size to that of the palm of the hand,[4] when it is generally of an oval form; it is known by the evidence of well-marked inflammatory changes seen in the thickened rounded edges, and the adventitious fibrous material not only around it, but forming its floor, and on its exterior uniting it to other parts. Thus the base consists often of nothing but new fibrous tissue lying directly on the pancreas, which unites it to the stomach, and by this means it may be also in firm union with the liver, as you see in this drawing.[1] Sometimes the point of union gives way, and then the contents of the stomach become extravasated into the peritoneal cavity, causing speedy death. The opening on the external side is generally small, round, and its edges thin,[2] and on the peritoneal membrane some old inflammatory exudation. Sometimes the ulcer presents no evidence of inflammatory thickening, but merely a breach of surface, as if the process had been more rapid. In these cases the ulcer is round, and is much larger on the inner than outer surface, the mucous membrane having been destroyed to some extent, but only its middle perforated throughout. It is remarkable how common perforating ulcers are met with in female domestic servants; and I am of opinion that the more chronic ulcer with thickened edges occurs in middle age, and the more simple form, of which I last spoke, in young girls. The ulcer, of whatever kind, is generally solitary; but occasionally two or more are found. Death sometimes happens from a blood-vessel being opened, as you see in these two specimens,[3] which both occurred lately, on the same day. In the one the ulcer is large, and the splenic and pancreatic arteries are opened at the spot where the bristles are inserted; in the other the ulcer is small, and the coronary artery exposed. This opening of the arteries reminds me that hæmatemesis is spoken of as a distinct disease of the stomach. It must necessarily arise from a breach of surface, although, as in the analogous case of the lung, this is not always found. This specimen[4] professes to be the stomach of a man who died of hæmatemesis, but in which no ulceration could be discovered; in other instances, however, the observer has been more fortunate, for this other one shows how minute an ulceration is sufficient to lay open a large artery.[5] These ulcers undergo a *cure*, as you may here[6] perceive, where there is a cicatrix in the mucous membrane, and some adhesions without. I do not think, however, that every puckered surface found at the lesser curvature implies a cured ulcer; for it may represent the disease in process of formation; we have been too much in the habit of supposing that all great structural changes have resulted from an inflammatory and ulcerative process,—that where there is a new fibroid tissue, that there, there has been an inflammation; or where a contraction, a previous ulcer. I have already shown you a thickened syphilitic larynx with an irregular mucous surface, without ulceration; and in the case of keloid in the skin the disease is invariably considered by the ignorant to be due to ulceration or burn: and thus I think a contraction or puckered surface, or a withering of the mucous membrane, may be due to an exudation and contraction of the material in the sub-tissue, without any actual ulceration. I say I think it is too much to presume a former ulceration in all such cases.

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[1] 1794, 1816. [2] 1800. [3] 1794^{30}. [4] 1803, 1804.

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[1] 296^{21}.

[2] 1802^{84}.

[3] 1805^{10}, ^{20}, and drawing 296^{25}.

[4] 1797.

[5] 1801^{30}.

[6] 1805^{25}.

CANCEROUS AFFECTIONS OF THE STOMACH.—As I have constantly before remarked, I believe the different names which we give to many diseases imply merely that there are some distinctions between them, and which make most of them easily recognizable; but, at the same time, these so often approach one another in character, that no very definite boundaries can be made. Thus we meet with well-marked soft medullary cancer growing in the stomach and destroying it; in other cases a firmer growth, which may be called scirrhous; in another a growth which appears simply fibrous; and at the pylorus the latter may be quite local, so that it is questionable whether the name cancerous can be applied or not. Combined with these forms we frequently have a gelatinous infiltration called colloid, which, however, may occur by itself; and there is also the disease called villous, which is often quite a local affection.

Scirrhous Pylorus.—There are all degrees of this condition, as regards its extent and degree of malignancy. The simplest form of disease is where the orifice is slightly thickened, and on examination there is seen to be some hypertrophy of the muscular coat and submucous tissue. This preparation[1] came from a man who died of renal disease, but had some vomiting, and the pylorus was found thus thickened; we can scarcely indeed apply the term cancerous to it, nor even to this more marked example,[2] where the disease existed four years, and caused the death of the patient; for you see it is quite local, and does not at all invade any of the surrounding tissues; moreover, the new material thrown out is very hard and fibrous, having no cells or juice, as cancer should have. The section shows very well the appearance of a scirrhous pylorus; before it was opened the enlargement at this part produced a tumor the size of a hen's egg, and was considerably removed from its usual site in the abdomen from the distention of the stomach, which reached to the pelvis. The pylorus still admitted a small quill through it:

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[1] 1806^{75}, and drawing 298^{30}.

[2] 1813^{3}.

on section the diseased condition was seen commencing immediately at the duodenum, and extended for two or three inches up the stomach, where it ceased,—the greatest amount of disease being between each of these ends, where the section is about three quarters of an inch in thickness. This section, you see, is in the form of a crescent, its greatest thickness being in the middle, and then tapering at each end towards stomach and duodenum. The thickness is due to a hypertrophy of the muscular coat, and an adventitious white fibrous tissue in the submucous layer; the former is seen as a semitranslucent grey substance without, and the latter as an opaque white homogeneous matter within. This gradual deposit in the submucous tissue it is which constitutes the primary affection and causes the obstruction, and the hypertrophy of the muscular coat is a subsequent result. You will obtain an idea of the appearance of a section by my making a rough sketch of a crescent, and dividing it into two by another longitudinal line: on the inner half is the white matter corresponding to the submucous tissue, having the mucous membrane covering it; and on the outer half is the muscular tissue, having its fibres in a perpendicular direction. In this, one of the last cases and most marked that we have met with, the appearance I have described constituted all the disease; it very often, however, proceeds further, and involves the surrounding parts; thus very commonly the mucous coat is involved, or actually destroyed, leaving an ulcerated surface within, or only partly so, so that here and there patches of the membrane remain. On the outside, in a similar way, the disease may extend, so as to penetrate the muscular coat; when, instead of this forming a distinct layer, merely isolated portions of it are seen on section; or even it may be quite destroyed by the adventitious tissue, until the peritoneal coat is reached, which becomes likewise involved, and nodules of the growth are seen protruding from the surface; in this case adhesions form to neighbouring parts, as the colon or liver, and the latter organ may even have some deposit within it. In some such cases as these it is not always easy to say in what structure the disease has begun, the site of the pylorus being a very favorite spot for cancer; and thus we have known a tumor felt in this region, and which caused obstruction to the passage of stomach, diagnosed a scirrhous pylorus, and yet the disease has been wholly without, in the lymphatic glands and adjacent parts. When the disease grows so extensively and rapidly, it has lost its simple fibrous character, and approaches more to simple cancer, the cells or nuclei being found in the adventitious matter; and the more this cancerous tendency exists, the more likely are you to meet with a fungating ulcer within the pylorus, and disease without in the lymphatic glands or liver; in this case it has a resemblance to the medullary character.

Often, however, instead of this disposition to destroy, the disease may extend slowly within the coats, and maintain its firm character; but instead of consisting of simple fibre tissue, it is seen to be composed of nucleated fibres, and resembling those *recurrent* or *semi-malignant* growths which are removed by the surgeon from the external surface of the body. In these specimens you see the organ immensely thickened throughout more than half its extent by this adventitious deposit. In one case the pyloric half is thus affected, and in another the half comprising the lesser curvature.

Medullary Cancer.—In its most marked form it constitutes a large soft growth from the mucous membrane, and tending to destroy the walls of the organ. One of the best examples I saw the other day in a private patient, where the stomach was at least half filled by numerous large sloughing cancers protruding into its midst. I think they are more frequently met with nearer the cardiac end, although they may occur anywhere, and thus in any case where it is probable the stomach is affected by cancer, if from the symptoms you believe it to be at the pylorus, the disease is in all probability scirrhous; but if near the œsophageal opening, it is probably soft cancer, as you see in these specimens.[1] Sometimes the the whole surface presents a large sloughing malignant ulcer, just as you see occasionally on the heart or other parts; of this you have an example here;[2] and in this specimen you see a medullary cancer attacking the pyloric end.[3]

Colloid.—I have already mentioned this disease as especially affecting the peritoneum, and in the most marked cases we find merely the membrane occupied by the disease, though the serous coat of stomach may be involved. In the so-called colloid cancer of the stomach, a compound disease is generally meant—where, for example, a scirrhous cancer is associated with colloid; and thus, when a section is made, the adventitious matter is found softer than ordinary scirrhous, and on examination a gelatinous substance is seen mixed with it, and which may be picked out with the point of

[1] 1807, 1815. [2] 1808. [3] 1812.

a scalpel. In these cases the muscular tissue appears more than usually destroyed. This specimen [1] of a section through the pylorus, shows this infiltration of the gelatiniform matter. A purer and simpler form of colloid is seen in this case,[2] where no ordinary cancer appeared in any part of the body; the whole of the coats are infiltrated with this jelly-like matter, the mucous membrane is raised, and on looking at its surface, it appears translucent from the pouring out of this substance beneath it. This one is a remarkable example of colloid affecting the œsophageal end only.[3]

Villous Cancer.—Much controversy has existed as to the cancerous and malignant nature of villous growths; the term cancer was at one time generally applied to them, whereas now the tendency of opinion is towards their local character and innocency. My own impression is, that the villous character is an accidental one, and may belong either to a benignant or malignant growth. The peculiarity exists in the surface being flocculent, and hanging in long shreds or filaments into the cavity of the organ; giving these growths a resemblance to bunches of moss or weeds. The microscope shows these villi to resemble very much the similar processes of the chorion of the ovum, and when the two are placed under water, the resemblance is very exact. When of the simple kind, as I shall have to show you in the bladder, they spring immediately from the mucous membrane, and have only the slightest fibrous basis, but, as in a specimen of intestine which I have here, there was a cancerous foundation. In this specimen [4] of the stomach, which we met with a short time ago in a woman who died of cirrhosis of liver, there were no marked gastric symptoms, but you see the inner wall presents this large villous growth; [5] there was no cancer in any part. In this old preparation you see also a growth having a villous surface, and is, probably, like the other, but I have not examined its base.

Polypus.—This is an occasional form of disease found in the stomach: in this specimen [6] you see one or two small growths consisting of fibro-cellular tissue, and here [7] are three pedunculated tumors found accidentally in the stomach of an old woman. Cases are recorded where a polypus of this kind has been vomited up.

Cysts and Pouches.—I showed you a cyst in the œsophagus which we lately met with in the post-mortem room, and I have seen a very similar cyst of about the size of a walnut in the walls of the stomach.

[1] 1813^{21}. [2] 1813^{29}. [3] 1813^{33}. [4] 1813^{70}. [5] 1811^{28}. [6] 1796^{25}. [7] 1813^{87}.

Here is a specimen of a pouch,[1] which may have been originally a closed sac, but broken into the interior, and if you look on the museum shelves, you will find a similar dried preparation.

MORBID CONTENTS.—You should always examine the contents of the stomach after death, and see whether they consist of food or merely mucus, and what is the color: if brown or black, it may be owing to blood or some medicine administered; chemical tests will detect iron, as the microscope will blood. It is, however, during life that it is most important to examine the vomited matter, when cancerous and other matters may be met with; after death the contents are seldom examined except for poisons.

The most interesting object met with is one of modern discovery —the *sarcina*, a vegetable fungus discovered by Goodsir, and to which Robin (I believe), has given the name of *Merismopödia ventriculi*. The sarcinæ are at once recognized in the contents of the stomach by their cubical form, or as if made up of four small cubes, or like a pack with a cord round it, whence the name sarcina. Many of these may be united together, forming large bundles, and occasionally have a greenish cast; they are found in those cases, especially of obstruction, where the food ferments.

I may here mention that a gentleman showed me, not long ago, some maggots which a patient had vomited and discharged per anum. These appeared to correspond to the *bots* with which the stomachs of cattle are affected, and which proceed from a fly called the œstrus bovis. In the horse, the œstrus equi, or gadfly, lays its eggs about the shoulders; these are licked off by the animal before or after the larvæ are produced, and pass to the stomach, where they remain during the winter. If the organ be then examined, the cardiac end is found covered by these bots or larvæ, rather smaller than the silkworm grub, and which you see in these specimens. They are attached to the mucous membrane by minute hooks, and do not, as far as I am aware, produce any inconvenience. They pass away with the fæces in the spring, when the pupa escapes as a fly. There is another variety in the sheep, which attacks the frontal sinuses. I mention this because, occasionally, the human subject is attacked in a similar way; and only lately I was reading that in some part of France several cases had occurred of severe inflammation of the frontal sinuses, followed by a discharge of maggots from the nose. Whether there be a distinct species of gadfly, an *œstrus hominis*, attacking the human subject, I do not know. In the Scottish islands, and elsewhere, the gadfly sometimes lays its eggs in the skin, producing a very tormenting affection.

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[1] 1796^{55}.

Air.—You not uncommonly find gas in the form of bubbles beneath the mucous membrane: in all such cases which I have seen it has arisen from decomposition; a true emphysema from extravasation of air I have never witnessed.

INTESTINE.

MALFORMATION.—This occurs both as regards shape, structural alteration, or position: of the former kind there is *imperforate anus*, where the intestine ends blindly or opens into the rectum or bladder, &c., constituting *atresia ani vesicalis, urethralis*, or *vaginalis*;[1] there is also the *diverticulum*, which I am constantly showing you in the post-mortem room, and of which you see specimens[2] here; these generally proceed from the lower end of the ileum, and are of various lengths; you may find pouches of the smallest size, or portions several inches long, like the cœcal tubes in birds. I may mention here, although I do not think they come under this heading, small pouches sometimes met with in the colon; these often exist in great number, and are generally not larger than a small grape; you see projections along the colon, and on examining these within they are found filled with fæcal matter. I do not know that any disease leads to this condition, although it may arise from dilatation of the follicles. I think the same thing is found sometimes in the lower animals. You see specimens of this condition here.[3]

A malformation from position is not uncommon, and is often very important as leading to obstruction and consequent death. The most frequent part for this change is the cœcum, which is found out of its position, and apparently dragged there by the contraction of adhesions; for, although it may be sometimes found loose, it is most generally connected with other organs. It is for this reason that a question generally arises whether the adhesions had been instrumental in the process; but if so, from the fact of the position being in many cases so altered, it is tolerably certain that the union must have occurred in fœtal life; and thus this is another illustration of what I told you, when speaking of malformation of the heart, that such conditions often arise from disease in utero; and in the present instance we can say so with more certainty, for I am not aware that endocarditis has ever been found in the fœtus while in utero; whereas I myself have several times met with peritonitis, both recent and old, in the new-born child. Adhesions occurring in extra-uterine life, no doubt, alter the position of parts to a certain extent; and thus we find the colon drawn down to pelvis, and the sigmoid flexure carried upwards, &c. In the cases of which I speak, however, more than this has occurred: the ascending colon, for example, may be drawn quite out of the loin so as to expose the kidney; it thus has a mesentery,—is, in fact, free and quite surrounded by peritoneum. In most of such cases adhesions pass from it to mesentery or rectum. Within the last two years we have had three such instances tending to a fatal result: in one, by the adhesions strangulating the ileum, and in the other two from the mere weight of the cœcum, which hung down as a large bag into the pelvis and was twisted on itself. In one of these the ascending colon passed up to the left loin, side by side with the descending portion. You will see these conditions in the preparation and drawings.[1]

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[1] 1882^{55}, ^{62}, &c. [2] See numerous specimens, some adherent to neighbouring parts.

[3] 1854^{81}, ^{82}.

Strangulation.—This, the most frequent form on the parietes of the abdomen, constitutes ordinary hernia, which is treated of by the surgeon.

It often, however, occurs internally from various causes. I have already spoken of the colon being out of place from adhesions, and leading at last to strangulation. Thus, the cœcum being free, the intestine becomes twisted on itself; the adhesions too, of which I have spoken, arising from a former peritonitis from this same part, are a very frequent cause of strangulation. Bands of adhesions from the surface of the cœcum, and including the appendix, may pass down to a portion of the ileum and directly constrict it; or the band may become adherent to mesentery, ovary, uterus, or other part, and constrict any coil of intestine which may happen to slip beneath it.[2] I think this is the most frequent form met with, but bands of adhesions may occur in any part. The abnormal cœcal appendices of which I have spoken have been known to cause adhesions to other portions of intestines or parietes, and cause strangulation.

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[1] Drawing.

[2] Specimens already alluded to, also 2507^{75}, &c., showing strictured duodenum.

Intussusceptio.—With reference to this disease, let me first tell you, judging from my own experience, that it is not nearly so common an affection as has been supposed; and as a cause of fatal obstruction in the bowel, is by far less frequent than the bands of peritoneal adhesions already mentioned. Before morbid anatomy was as much cultivated as at present, it was thought in cases of internal strangulation, where symptoms were sudden and speedily fatal, that such an introversion of the intestine must have occurred; I should say, however, that the rapidity of the symptoms rather militate against such a supposition, seeing that in intussusceptio the impediment is mostly partial and of slow progress. My own experience is this, that I have never seen but one case of intussusceptio in an adult, and in this case the obstruction was never complete, and death did not occur for some weeks. In infants, however, the affection may rapidly take place, and is speedily fatal. It is only, of course, where the introversion is permanent that symptoms occur, for it is highly probable that a slight slipping in of one portion of bowel into another is constantly taking place, if we judge from what is frequently met with on the post-mortem table; in children especially, who have died from cerebral disease, the intestines are found contracted, and often invaginated in several places; these are readily pulled out. The occurrence in this class of cases naturally suggests a nervous influence productive of the condition. These are mostly found in the small intestine. In all the fatal cases that have come before my notice, it has been the large intestine affected, and in most instances by the inclusion in the first place of the ileum in the cœcum, and then a gradual inversion of the large intestine itself.[1] In these cases the obstruction was never complete; and in some, death eventually took place from ulceration of the bowel. You can easily see how the passage is to a certain extent pervious, by attempting to imitate the invagination on a finger of a glove: if you simply force one part into another, and then cut off the top so as to leave the channel open, you have a resemblance to an intussusceptio. Students are often at the moment puzzled, when asked to enumerate the layers met with in a section of an intestine so invaginated; but it only requires a moment's consideration to know that the serous and mucous coats can never alter their relative position, and thus textures of the same character are always in contact. Thus, on looking from without, you see the serous surface, both of included and including intestine, with a pouch of serous membrane between them; and if the intestine be opened,[1] the mucous surfaces are in like manner in contact. In order to see the amount of mischief produced, we generally open the containing bowel, or sheath, and thus expose the included portion within; we then discover the mucous membrane undergoing various changes, according to the degree of strangulation, and we find that the example of the invaginated finger of the glove does not perfectly hold good, nor, indeed, the ideal or diagramatic drawings of an intussusceptio; for in these the tube is supposed to be simple and free, but the intestine has a mesentery attached, which acts a very important part in the process; it is this membrane which prevents intussusceptio from more frequently occurring, but, if once taken place, causes such a drag upon the included part, as sometimes to perfectly close the canal. Thus, when you open the outer intestine, or sheath, you do not find the included portion simply lying within, as the turned-in glove, but, owing to the lateral attachment of the mesentery, it is highly corrugated and dragged to one side, and thus the opening of the bowel is not at the extreme end: indeed you can very well imagine what would occur by slipping one piece of bowel into another, with the mesentery attached and constantly dragged upon; this would necessitate a curve in the included portion, and remove its opening from the extreme end. This dragging of course obstructs the vessels of the mesentery, and consequently, this structure is found of a dark color, and sometimes indurated from blood effused within it. At the same time the intestine, from being strangulated, becomes of a dark color and slowly gangrenous, and tends to become separated;[2] and during this process, the serous surfaces of peritoneum at the part where the one portion slips into the other, are becoming united by the lymph which is exuded. This is the process of cure; but during the sphacelation and separation death often occurs, by an ulceration of the intestine at the point of junction, or an extension of the inflammation through the peritoneum. In the last case we had here, the large intestine was merely involved, and the included portion protruded from the rectum; and in the one before this,[3] although the process had begun at the cœcum, it had gone on until also in this case the included part could be felt per rectum. You will see several specimens of intussusceptio here; this[4] is a very remarkable one, sent us by Mr. King, an old student,

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[1] 1847, small intestine; 1875^{10}, ileum into cœcum.

[1] 1850^{40}. [2] 1851^{7}. [3] 1874^{25}. [4] 1875.

from a child who suffered from internal strangulation for eleven days; and just at the time when death seemed inevitable, this passed from it, which you see is the ascending colon, with cœcum and appendix attached. The part had been strangulated, and discharged, so that the ileum which entered the large intestine must be now united to the transverse colon.

INJURIES.—These are mostly fatal, from the fact of some of the intestinal contents being extravasated into the peritoneum, and setting up inflammation; otherwise wounds are not necessarily fatal, for if the intestine should protrude, or can be secured and stitched up, a closure may follow, the threads passing into the canal and discharged in the usual way from the body. Several such cases are recorded. Most of the injuries to intestines which we witness, occur from falls, or wheels of vehicles passing over the abdomen; in these cases the injuries occur from stretching, rather than from direct violence; I shall show you this in the liver and other organs, but it is more particularly the case with the bowels; when, for example, if a wheel passes over the abdomen, one portion is dragged from another, and the movable part separates from that which is fixed.[1] Thus, although the duodenum and jejunum are most protected, yet these are the parts very often injured, or the one separated from the other, because the former constitutes a fixed point; and thus the reason why the mesentery is so often found torn in these cases, which is evidently from its being stretched. You will observe the different texture and elasticity of the coats, how the mucous membrane is pulled out, while the peritoneum is divided sharply; and at those portions where a complete separation has taken place, the mucous membrane is completely turned over the other; I suppose the muscular coat contracts, and carries this with it. You see the same in these specimens, where the intestine was punctured by a sharp weapon; the edge is not smooth and formed of peritoneum, but has a raised ridge about it of everted mucous membrane.[2] This specimen of sigmoid flexure shows how the peritoneal coat may be torn off, without affecting the inner ones.

CONGESTION.—This is generally of a passive kind, and associated with a similar condition of the stomach, as already mentioned, as a consequence of heart disease. Owing to the delayed circulation through the vena cava, the liver is gorged and becomes nutmeg, and which again necessitates an engorgement of the portal system, and thus the congestion of mucous membrane of stomach and intestines. It is, however, more especially in primary hepatic disease, as cirrhosis, that the greatest congestion is seen. Owing to the pressure of the blood on the portal vessel, the serum escapes on the peritoneal surface, constituting ascites, and on the mucous surface it often escapes in a pure condition, and thus blood may be found in the intestine; if not, the mucous membrane is highly congested. Any mechanical cause impeding the flow of blood may also produce it, and thus in a strangulated portion of bowel the congestion is often excessive. You may also find it sometimes without any apparent cause; whether there may have been any temporary obstruction in the portal system is difficult to make out; but in several cases I have met with this extreme purple congestion of the mucous membrane: I have seen it a pyæmia, and this has suggested a cause in a morbid state of the blood itself; and when in a slight degree, it may arise perhaps from an irritant in the shape of food or medicine, and the redness is observed more on the rugæ; if there be any large quantity of mucus or lymph adherent to the prominent parts, we must consider that the hyperæmia is inflammatory.

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[1] 1851^{84}.

[2] 1851^{90}.

INFLAMMATION OF SMALL INTESTINE.—Enteritis, or inflammation of the small intestine, has generally been a term denoting certain symptoms of derangement of the bowels, and used consequently more vaguely than would be done by the morbid anatomist. As I have repeatedly said, the occurrence of simple acute inflammation in the healthy body is not very frequent, and observation every day more confirms the idea that some constitutional cause precedes the local manifestation, and thus it is that acute disease varies with the circumstances which produce it; and so, as regards the intestines, we have the different affections styled tubercular, typhoid, &c. The discovery on the post-mortem table of a general acute inflammation of the whole interior of the intestinal canal, without any obvious reason, and to which we can give the name idiopathic enteritis, is not common; if, however, we find results of inflammation, as ulcers, throughout the intestine, which is more frequent, we cannot withhold the name. The mucous membrane, when inflamed, presents the same appearance as in other parts, red from hyperæmia, and covered with excessive secretions of mucus; it is for such reason styled *catarrhal*.[1] As in the case of the stomach an inflammation

[1] 1822^{60}.

may be set up by irritant poisons, and therefore in suspicious cases the whole canal should be carefully examined. If the duodenum is especially affected, the disease is called ***duodenitis***. It is highly probable, as I said of the œsophagus and stomach, that inflammatory states may be constantly occurring during life, and yet not coming under the cognizance of the morbid anatomist. Thus the changes which no doubt are constantly happening in the stomach, from improper food, are propagated to the duodenum; and it is even thought that some forms of dyspepsia are due to its inflammation; and a continuance of this up the choledic duct produces jaundice and other affections of the liver. It may certainly be found highly congested in the same case where the stomach is, and in poisoning, the duodenum often participates. It may, however, be affected alone, since occasionally ulceration is met with in this part of the intestine, and no where else; on two or three occasions I have met with these,[1] and sometimes they give rise to perforation and fatal peritonitis.[2] The ulcers give no clue as to their cause. The most interesting fact respecting ulceration of this part is the observation of Mr. Curling, that it often is met with in cases of burn, of which he has cited numerous examples; it has not been my lot, however, to meet with this, although I have now examined several instances of burn; but I suppose it occasionally occurs.[3] You meet with great difference as regards the size of Brunner's glands in the duodenum, sometimes being scarcely visible, at other times being very large and prominent, as you see in this drawing, which was taken from a case of cholera. Occasionally ***ulceration*** may be found existing through the whole of the small intestines, in the form of numerous ulcers with raised vascular edges, and without any disease in any other part of the body. These ulcers do not correspond in shape to the intestine, but their greatest length is from side to side, so as to entirely encompass the circumference of the bowel; but if not quite meeting, it is on side of attachment of mesentery. Such cases are not common, and when met with, their pathology is not very clear. In long-protracted diarrhœa some ulceration may be always looked for, except in children, where the diarrhœa or gastro-enteritis is often more an effect of improper food than a primary disease; in fatal cases of this kind we generally fail to discover any other appearance than an excessive enlargement of the intestinal glands; thus you may see the duodenal and Peyerian glands enlarged, but

[1] 1830, 1830^{50}. [2] 1830^{55}. [3] *Guy's Hosp. Reports*, series iii. vol. ii. p. 133.

more especially the solitary, both in small and large intestine; these are seen as small projecting bodies from the mucous membrane.[1] You should remember, however, that these glands, as well as the mesenteric, are comparatively larger in children than adults; and thus I have heard students inquire if such have not been enlarged, when I believe they have only been natural.

Diphtheritic Inflammation.—In cases where the colon is thus affected, the small intestine may often be included; but I will defer the mention of it until I come to the large intestine.

Typhoid Disease of Intestine.—In typhoid fever the Peyerian and solitary glands are affected in a peculiar manner by a material deposited within them, and which subsequently is absorbed or sloughs out. It has generally reached its greatest amount about the tenth day, at which time the most favorable opportunity is presented for observing its nature, although it is not often that death occurs at this time. The deposit is soft and of a brown color, and is met with in Peyer's patches in the lower part of the ileum, and in the solitary glands of the same part, as well as of the cœcum, and sometimes in ascending colon.[2] Since Peyer's glands are larger and more numerous at the very end of the ileum, and are smaller as we proceed upwards, so necessarily is the deposit greater at the termination; here there are often three of these patches near together, and these being occupied by the adventitious matter, the intestine is almost closed, as you may see in this example. Not only is there more disease below, but it has further advanced, showing that the deposit first occurred in the larger patches at the inferior portion, and then proceeded upwards; we thus find, for a distance of about two feet up the ileum, smaller masses of the same deposit or exudation. If this be examined by the microscope you see merely cells, some of them with three or four nuclei; but, as I before said, I do not know that these are characteristic; at least I do not think they could be recognized as typhoid. The usual time for examining the disease, when death has occurred, is after the third week, when it has arrived at its height. In these cases, although we may still find the deposit in the upper glands, it is almost removed from the lower, where a roughened or ulcerated spot is left. The ulcer, if there be one, has sufficient of the material about it to render it capable of our recognition as of the typhoid character, and assistance is also

[1] Several specimens showing enlarged glands, and drawing 304^{30}.

[2] Several specimens, 1844^{10}, &c., and 1838 injected.

afforded by the simultaneous affection of the mesenteric glands. It is still a question, what becomes of this adventitious material,—whether it is absorbed or sloughs away, leaving an ulceration. We are so in the habit of finding ulceration in fatal cases of fever, and speaking of typhoid ulceration, that we have generally looked upon it as the natural process, but this I think is not proved; that ulceration often deeply affects the coats and leads to perforation we know constantly occurs, but it does not follow that ulcers are always left in the bowel in cases of recovery; the material is got rid of partly by sloughing, and, probably, partly by absorption, for we may actually see loose detached pieces; and where, indeed, a mass has diminished in size without any apparent detachment of substance, we suppose absorption has occurred, as we know must have been the case in the mesenteric glands. That a great change must be apparent in the mucous surface after fever is apparent from the deposition and absorption of the material. It is about the tenth or twelfth day that you would see to perfection the glands thus affected; Peyer's patches presenting large raised oval mass projecting into the intestine, and amongst these round masses like peas, corresponding to the solitary glands, which also are generally seen in the commencement of colon; at this time the mesenteric glands are also found enlarged. At the usual period of death in fever, the glands are found covered with a small amount of this material, forming irregular projections, and often the mucous membrane is ulcerated, leaving the muscular coat bare beneath; and sometimes, if death has occurred from perforation, a small hole is found at the bottom of the ulcer, through which fæcal matter has passed, producing fatal peritonitis. In some cases this occurs from several minute pin-hole perforations, which have allowed some exudation through them, and thus set up the final inflammation.

Tubercular Disease and Ulceration of Intestine.—This is, perhaps, the commonest form of disease to which the intestine is liable, and it is remarkable that the same parts are affected as in fever, of which I have just been speaking. The disease begins for the most part in the solitary and Peyerian glands of the ileum, by deposit of tuberculous matter within them; this afterwards softens, and an ulcerated surface is left.[1] If the intestine should be primarily attacked by this disease, it may proceed to a great extent, until the mucous membrane is destroyed, and in such cases there is generally an accompanying tuberculous deposit on the peritoneal surface; the intestines then become firmly united, and we have a general tuberculous disease of the whole of the bowels, or, what is sometimes called (though improperly in such a case) tubercular peritonitis. The disease is most frequently met with in conjunction with phthisis, and it is here where it can best be studied, since all its phases are constantly met with. In an early case all we can find is, on examining the lower end of the ileum, small, round, tuberculous deposits in the mucous membrane, and corresponding mostly with the solitary glands; in the Peyerian patches also similar deposits may be found; at a later period these deposits are seen softening in their centre, and soon an excavation is formed; an inflammatory process then ensues, followed by an ulceration, and the mucous membrane becomes destroyed; and thus in a severe case you find large ulcers with raised vascular edges, on which some tuberculous deposit may be seen, as well as on the base of the ulcer, and generally on the corresponding side a patch of tubercle; the serous membrane on which they are placed being highly injected. The commencement of the large intestine also generally contains similar ulcers, and a very favorite site for ulceration is the ileo-cœcal valve; also, if the appendix vermiformis be opened, some ulceration may be found within it. You may remember that only lately we had a case where more than half a foot of the lower end of ileum was entirely destitute of mucous membrane. The importance of the serous membrane being involved in the scrofulo-inflammatory process is seen in the event that the surfaces become adherent and thus prevent perforation, which is a rare occurrence in phthisis. The mesenteric glands may or may not be affected with tuberculous disease in these cases.

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[1] 1828^{75}, 1831^{48}, 1862, &c., and perforated, 1834, &c., and drawing, 306^{50}.

INFLAMMATION OF CŒCUM AND APPENDIX.—The affections of this part of the bowel are so frequent and important, that it is necessary to speak of them separately. When an inflammatory process has been confined to the coats of the gut itself, the term *cœcitis* or *typhlitis* has been given; and when the cellular tissue around is especially involved, *perityphlitis*. It is not clear, however, that any one particular form of disease is here intended by those who make use of these expressions, or that idiopathic inflammations corresponding to these, frequently occur; for we know, indeed, that the diseases of the part arise, generally, from some prior morbid process in the appendix. The latter, again, may be the subject of ulceration both in fever, phthisis, &c., as we have just seen; it may have various morbid secretions occurring in it, or concretions, or even foreign bodies lodging in it, which shall light up inflammation in the surrounding parts. The suddenness of the attacks of cœcitis, and the local peritonitis following, even in the large number of cases which recover, all point to the appendix as being the very frequent cause. Thus in the last case which I saw recover, judging from the patient's constitution, I believe the inflammation to have arisen from tubercular ulceration; and in the last fatal case which we examined here, we found the appendix ulcerated, and a small calculus outside it, so that the cause varies in different instances. In some cases it does not appear necessary for an actual perforation to have occurred, for the appendix may be so diseased, that it may implicate the adjacent parts in the inflammatory process in a slower manner. In those which recover, the inflammatory symptoms slowly subside, or an external suppuration may follow, and the cause remain unknown; and in fatal cases, so general a peritonitis may have occurred, or so much suppuration around the cœcum, that it is then difficult to arrive at the exact nature of the complaint; thus you may find the appendix sloughing or gangrenous, as if some foreign matter had been discharged from it, and yet be unable to discover it. Foreign bodies of small size, such as fruit-stones, may collect in the appendix, and cause its ulceration; and to show you how readily substances may enter it, here is this specimen, which many of you saw taken from a woman who lately died of hernia, and who, to obtain a passage through the bowels, swallowed a quantity of shot: these you see have lodged in the appendix.[1] I believe, then, that many of the cases of disease about the cœcum, arise from a chronic morbid process in the appendix itself. If you are in the habit of examining it, you may often find a morbid secretion within it (the mucous membrane possessing solitary glands), a thick mucus, and, sometimes, a material like wax, which appears quite peculiar to it. The appendix is found rigid, and on opening it, is seen to contain a semi-translucent matter like wax, and which on section, often consists of concentric layers. This is sometimes of a brown color, and hard, and has a disposition to ulcerate through, and at other times earthy matter is combined with it, until a perfect stony concretion or calculus is formed. Last year we examined the body of a man who died after a sudden attack of peritonitis, and found it due to such a calculus, which had made its way through the appendix; it was composed of phosphate of lime in concentric layers.[1] In some cases the exterior is earthy, and the centre soft and partly feculent.[2] You will read in books that cherry-stones, and especially date-stones, have often accidentally lodged in the appendix, and given rise to the subsequent mischief. Now, as it so happens that I have never yet met with these bodies, and that the hard brown concretion in the vermiform process very much resembles a date-stone, I cannot help feeling a suspicion in my own mind, that a mistake has often been made as to their character: I cannot, of course, deny that such was the case in instances recorded, but the very great resemblance which these concretions have to date-stones is sufficient to raise a doubt. It is possible that in some cases the nucleus may be a foreign body, and thus have really laid the foundation for the concretion.

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[1] 1864^{25}.

Inflammation of Large Intestine.—The term *colitis* is sometimes used to express this state, and the term dysentery, as synonymous with it. Our language has been too indefinite, and, indeed, incorrect, in speaking of all affections of the large intestine as dysenteric, for although the true dysenteric process has not yet been agreed upon by all, yet, in all probability, it is one having certain definite characters. I think, then, we must not use the term colitis, as some do, as synonymous with dysentery; the latter being, in fact, only one variety of colitis. A simple inflammation exhibiting merely a hyperæmia, and increased mucous secretion, might be called *catarrhal*, as in the stomach. I have already said, that in some cases of cardiac disease, as well as cirrhosis of the liver, the congestion has passed into a state which can be called by no other name than inflammation. We occasionally also find an inflammation in certain febrile and other disorders, as pyæmia, without any evident cause; patches of the colon being red, inflamed, and covered with tenacious mucus, or even adherent lymph.[3] You will be surprised to find how frequently the large intestine shows evidence of inflammation and ulceration in cases where you had no suspicion of disease during life. Inflammation may arise from irritant poisons, and it is remarkable to notice how these may pass down the small intestine without affecting it, and then set up violent inflammation in the large. This has especially been the case in two or three instances of poisoning by bichloride of mercury which I have seen, where the small intestine had escaped with impunity, but the large had even had its mucous membrane destroyed. There are cases probably, however, of simple idiopathic colitis, though rare, and which may, indeed, be examples of acute dysentery; but such, in the absence of those peculiar features which are supposed to characterize that disease, can scarcely receive the name; thus, for example, we have seen a case attended by discharge of mucus and blood where, after death, the whole internal surface of colon presented a highly vascular, soft, red surface, covered with tenacious mucus or adherent lymph, and here and there a few minute points of ulceration; and the coats, also, much swollen by exudation into the mucous and submucous tissues. The propriety of giving the name of acute dysentery to such a case, would depend much upon the opinion whether the disease can occur in London or not.

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[1] 1881^{25}, 1894^{51}, and numerous other specimens.

[2] 1893^{25}, ^{30}.

[3] 1864^{16}.

Diphtheritic inflammation, or *dothinenteritis*, is the term given to that form of inflammation where the secretion is firm, and forms an adherent layer on the surface. Such cases are not infrequently met with, and I have now seen several. It is difficult to say the cause and duration of such a form of malady, but I believe it may occur in a few days. On opening the intestine, you see what these preparations and drawings represent:[1] the whole surface of colon of a grey color, the mucous membrane being hidden by a firmly adherent deposit upon it; this could be stripped off with difficulty, and found to be very tough, and surface granular; the mucous membrane beneath, was found for the most part healthy, but in some places very minute ulcerations were present, occupying apparently the site of the follicles; and in other parts highly congested. In these two specimens, the lower end of the ileum was also involved, but only in patches; a stream of water flowing upon these failed to move the adherent lymph. A section shows the walls somewhat thickened, but this may be due to the contraction of the gut. I have seen this diphtheritic inflammation occur in two or three instances as an idiopathic and fatal form of disease. In these cases the adventitious matter could not be detached as a distinct membrane; but occasionally in some forms of inflammation of the large intestine, *casts* of the intestine may be passed as well as long pieces of mucus, which are often mistaken by the patient for worms. These long pieces consist mostly of mucus containing cells, but occasionally, if placed in water, they will be found to be hollow, and correspond to the part of the gut from which they have exuded, constituting

[1] 1857^{10}, ^{15}, &c.

indeed a mould of the intestine, the microscope detecting the marks of the follicles, and arrangement of the mucous membrane.

Dysentery.—The disease bearing this name, and which terminates often with such destruction of the inner surface of the colon, is believed by Dr. Baly, as he observed it in the Penitentiary, to commence by an affection of the solitary glands; and this is the opinion of many of those who have seen the disease in tropical climates, although not the opinion of all. The malady begins by an enlargement of the solitary glands, which become raised above the surface, and filled with a gelatinous-like substance; this condition I not long ago had an opportunity of seeing, in the colon of a sailor who had suffered from dysentery; on the mucous membrane there were several projections like peas, which, on being opened, exuded thin white fluid. After a time, these burst, and an ulcer is left, the adjacent mucous membrane is involved, and the ulcers soon run together, until large patches are formed; the intervening mucous membrane, being inflamed, secretes large quantities of mucus, and its hyperæmic surface is constantly bleeding. When the disease is epidemic and fatal, as occurs abroad, in a few days, the mucous membrane may slough, and whole surface become gangrenous. If dysentery be a peculiar disease of the glands of this kind, the simple inflammation of the colon already mentioned is a distinct malady; but I should inform you that some hold the simplest form of dysentery to be an inflammation of the whole mucous membrane, affecting especially the follicles, and leading to great swelling, vascularity, and secretion from the membrane, and subsequently ulceration, such as I have already spoken of as simple colitis; there are others, too, who include the croupous or diphtheritic form of disease also under dysentery; and, therefore, under this designation they would describe a *simple inflammation* of the mucous membrane, ending in ulceration, a *diphtheritic inflammation,* and a disease beginning in the *solitary glands,* as well as the most rapid and fatal form, where mucous membrane rapidly sloughs. You see, then, that opinions still differ as to the true nature of dysentery, some referring only one of these disorders to this head, while others include all the inflammatory conditions of the large intestine, or all forms of colitis. If this be correct, the diseases already described should be ranked with dysentery, and we may look upon them as passing one into the other. In an acute form of disease, then, you would see the mucous membrane of a deep red color, swollen and pulpy, or soft, so that it can be easily torn, when, also, some exudation would be found beneath it; the surface covered with purulent mucus, and the solitary glands found projecting and full of fluid, as I have described. Subsequently, ulcers are produced, and the disease presents the appearance usually seen when coming under our notice as a chronic affection in sailors who have arrived from abroad. In fatal cases of this kind, we find the colon extensively disorganized;[1] the interior presenting a most irregular surface, from the form of the ulcers; these may be isolated, and scattered over the membrane, but more usually they are united, and form a continuous serpentine ulceration throughout the larger bowel. The floor of these ulcers is the muscular coat, or, if any repair is going on, an adventitious hardened lymph is formed on it. Between the ulcers, the mucous membrane is raised, red, soft, in the form of so many islands, and, if the curative process be at all present, the edges are still more raised, vascular, and indurated. The walls of the intestine are, at the same time, thickened by adventitious fibrous structure in the submucous tissue, and sometimes by hypertrophy of the muscular coat; this, however, may only be apparently thickened, owing to the contraction of the gut. These ulcers may heal, and then we find the various stages of cicatrization present, or sometimes the intestine altogether healed; on the floor of the ulcer a lymph is exuded, which becomes a hard callus, and which, contracting, draws together its walls, and thus you may often find cicatriform patches where the tissue is puckered and radiating to a centre; when quite closed, all that is left is a puckered surface of a slate color, these healed ulcers generally presenting a darker hue than the healthy mucous membrane, due, probably, to the change which the hæmatine has undergone; most of the pigmental changes found in membranes after inflammatory processes having their source in the chemical changes in the coloring matter of the blood. When a whole surface has been ulcerated and healed, it presents a very irregular and puckered aspect,[2] and the hue is more or less of a slate color. To examine the state of the membrane, you should place a piece of the gut in a plate under water, when you will observe better the integrity or not of the surface. I have seen one or two cases where the ulcer has penetrated the colon, and set up a fatal peritonitis. The occurrence of hepatic abscess with dysentery, I shall mention in my next lecture.

Simple Ulceration of Large Intestine.—If all forms of inflammation of the colon, or colitis, are to be ranked as dysentery, then the results of the inflammation must also be included under the same term, and all ulcerations of this part will receive the name dysenteric—this is, in fact, adopted by some; if, however, it be so, we can only say that between simple ulceration and acute dysentery there is a wide difference, only to be explained by the view that the latter is a disease of tropical climates, and the former the less severe and more chronic affection occurring in our own country. We are much in want here, as elsewhere, of a more precise definition of terms. Ulceration of the large intestine is one of the most common post-mortem appearances we meet with;[1] in persons long ill with various visceral complaints, nothing is more common than to find large ulcers in various parts of the large bowel, but more especially in cœcum, ascending colon, and sigmoid flexure. These are mostly of a chronic character, with raised indurated edges; some spreading while others are healing. They probably have the same pathology as many ulcers on the leg connected with a retardation of venous circulation. Ulcers of the rectum are very distressing in their symptoms. These ulcers have their length in the direction of the transverse course of the bowel, passing around its circumference. In cases of phthisis and tubercular disease, it is not uncommon to find such ulcers, and not, apparently, having a tuberculous character.

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[1] 1860, &c.

[2] Healing ulcer, 1831^{64}, &c.

I may here show you these specimens[2] of intestine where a communication exists between the interior and an external abscess, in which it has been pretty satisfactorily shown by Dr. Habershon that the latter penetrated the intestine from without, a process which many persons formerly doubted.

Stricture of the Intestine.—You will find that, except in the large intestine, it is rare to meet with a simple inflammatory contraction of the gut which can pass by the name of stricture, most cases of strangulation being due to some adhesions externally, or some chronic disease, often of a cancerous nature, within. I have seen a case of ulceration of the colon, during the process of cure, end in a cicatrix, which constricted the intestine and was the cause of death. Most constrictions due to disease of the bowel itself are met with in the large intestine, and more particularly in the sigmoid flexure of the colon; these are very frequently of a cancerous nature, but may arise from a simple inflammatory process. If so, it is owing to a cicatrization of ulcers in mucous membrane, or to an induration of

[1] 1863, 1863^{30}.

[2] 1881^{98}, ^{99}; 1882^{b}.

cellular tissue around that part of gut not covered by peritoneum; and of the latter kind I have seen several. I am speaking now of what is met with on the post-mortem table, for in practice you will be constantly meeting with cases which may be styled stricture, but dependent on malposition of the uterus, painful ulceration of anus, or other causes purely nervous. The last two cases we examined here were due to pelvic cellulitis, causing contraction of a hard fibrous tissue around the rectum. This one had been of years' standing, and resulted from a labor;[1] the canal was so narrow and the walls so hard that the name scirrhous cancer had been given it during life. In the other case, the induration of cellular tissue around rectum appeared to have been connected with a most extensive inflammation and ulceration of the external genitals.

ADVENTITIOUS GROWTHS—*Polypi.*—Occasionally, on opening the intestine, we may find small growths hanging from the mucous membrane. Their seat is, however, generally the rectum, where they come under the notice of the surgeon; here are some[2] which Mr. Bryant has removed from children among the out-patients. They are small round bodies, consisting of a fibro-cellular structure, and highly vascular. Occasionally, we meet with small polypoid growths in other parts of the canal, as you see in these specimens.[3] In this one, there are a number attached,[4] and forming a bunch of pedunculated tumors, very similar to those sometimes met with in the bladder.

Tubercle.—I have already mentioned tubercle as occurring mostly in the glands at the ileum; and thus it is you constantly see, in cases of phthisis, extensive ulceration of the ileum, ileo-cœcal valve, and ascending colon.

Cancer.—The same remarks hold good with respect to the intestine as they do to the stomach, that there are various growths affecting it: a well-marked carcinomatous tumor, on the one hand, and, on the other, a firm scirrhous growth, passing by degrees into a simple fibrous structure.

Medullary.—We occasionally meet with a large, soft, encephaloid mass growing from the mucous membrane as from any other part, as you see in this specimen[5] of a round tumor on the ascending colon, and in this one of a growth from the ileo-cœcal valve.[6] One of the most remarkable of this kind is this specimen, which occurred

[1] 1888^{80}.

[2] 1887^{65}.

[3] 1881^{91}, 1873.

[4] 1887.

[5] 1881^{97}.

[6] 1854^{30}, 1881^{96}, and drawing 314.

to us not long ago, where the whole duodenum and part of jejunum were covered with a soft cancerous growth, and other parts of intestine with smaller isolated tumors. This is not the class of cases which causes death by obstruction.

Scirrhous Cancer and Stricture.—This is the most important form of disease in the intestine, as it causes death by constriction. It affects mostly the large intestine, and especially the sigmoid flexure of colon and rectum.[1] The gut is found much constricted by the disease, which has a resemblance to scirrhous pylorus: that is, there is a tough adventitious deposit in the submucous tissue, and the muscular coat external to it much hypertrophied; and in some cases this and the cellular tissue around are involved; if the case be at al advanced, the mucous membrane will have been destroyed, and a vascular sloughing ulcer will be found within.

If the disease attack the rectum, a greater destruction of the tissues forming the walls of the gut occurs; in all these cases the disease is generally quite local In some instances, which I have heard styled cancerous, the affection has resembled exactly the scirrhous pylorus, and, therefore, scarcely deserves the name, seeing that the adventitious material is simple fibre tissue, and is confined to the submucous structure.

The effects of such slow strangulation are seen on the bowel above, by thinning and actual perforation of the walls. Thus you will see in this colon, from a case which was under my care last year, that a stricture exists at the sigmoid flexure, and, as a consequence, the whole large intestine has become immensely distended,[2] and at one spot burst. The interior, you see, exhibits a number of transverse depressions, resembling ulcerations, where the mucous membrane has given way, leaving the muscular coat exposed and barely covered by the peritoneum, and which also has given way at the cœcum. I have seen two other specimens exactly resembling this.

Colloid disease occasionally involves the large intestine, as the colon, when the peritoneum is affected, and also sometimes attacks it locally in the sigmoid flexure or cœcum.[3]

Melanosis may occasionally affect the intestine when the body contains it elsewhere.[4]

Villous Cancer.—I have already said that opinions vary as to the innocent or malignant nature of this disease, but I have had proof lately that the villous character of a growth does not necessitate any peculiarity as to its substratum. In this specimen you see an example of the disease as we meet with it in its local form. It is circumscribed, and projects so much from the mucous surface that the canal is closed. You see all the coats are thickened, both muscular and submucous, and projecting into the canal is the mucous membrane, with a number of shaggy processes or villi hanging from it.[1] In a case of dysentery one of the healed ulcers put on this character, and, showing how ready the mucous surface is to adopt this villous appearance, I lately saw a specimen, exhibited by Mr. Sibley at the Pathological Society, of a large intestine whose whole inner surface was covered with this flocculent growth. It appeared at first glance like one of the diphtheritic intestines I have shown you, and I am not sure that such might not have been its nature; but from the process being chronic, the inflammatory deposit had assumed this character. Then, again, to prove that this condition is accidental, in the preparation of cancer of the duodenum which I just now showed you, there were masses of cancer distributed through the intestine, and in various intermediate places small growths of a villous character, showing that true cancer may also assume this appearance.

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[1] 1854.

[2] 1854^{48}, 1854^{38}.

[3] 1854^{67}.

[4] 1873^{75}.

Morbid Contents.—*Concretions.*—These may have been secreted in the intestinal canal, and styled *enterolithes*, or formed from matters taken into the bowel, and therefore *accidental*.

I have already mentioned that calculi may form in the vermiform appendix; the earthy matter, consisting mostly of phosphate of lime, which is secreted by the mucous membrane, and forming concentric layers, the nucleus being fæcal matter or some accidental substance. In other parts of the intestine very large calculi may form, as you see here, and sometimes cause considerable obstruction; in this case the concretion made its way through the cœcum. In the lower animals very large stones may form, as these from the intestine of a horse; they often have a nucleus of oats, or consist wholly of vegetable matters. In this one, composed of triple phosphate, the nucleus is a piece of iron. Some of the most remarkable of these are the benzoars, found in the intestines of the wild goat inhabiting the Persian province of Khorassan, and which are soft, and contain a peculiar principle, styled *egallic acid*. *Accidental concretions* are those which may form from substances taken as food or medicine, and thus masses of chalk or magnesia have occasionally collected in the inside; and I may here show you these remarkable hair-balls, like masses of felt, taken from the stomachs of cows, and a somewhat similar mass of hair I have seen removed from the stomach of a lunatic.

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[1] 1854^{65}.

You may also meet with substances which have not been formed in the canal, but passed into it, as gall-stones—these sometimes being so large as to cause fatal obstruction;[1] and several other substances you will see on our shelves, as coins, knives, stones, &c.

Entozoa, or Intestinal Worms.—The four commonest kinds are the *tænia solium*, or tapeworm; *ascaris lumbricoides*, or round worm; *ascaris vermicularis*, or thread-worm; and the *tricocephalus dispar*. The most interesting subject in connection with these worms is their mode of development, discovered by Von Siebold and Küchenmeister. These observers have shown that the vesicular worms, such as hydatids, are but the immature forms of the long worms; and, although the relation between these two varieties in the human body has not yet been accurately shown, yet experiments on the lower animals have fully confirmed their intimate connection. The perfect animal, or worm, which has sexual organs, lives in a part of the body containing air, while the incomplete animal, as the hydatid, is developed in a solid or parenchymatous organ. Thus, instead of the ova of the tapeworm (for example) producing young animals of the same form, other intermediate stages of development occur of the same entozoon, within other parts of the body, constituting the cystic variety; so that the latter is the incomplete form of the long worm. Experiments on the lower animals show that if a cysticercus be taken into the stomach it will soon be developed into a tænia; and again, that the ova which are produced from this animal, if taken into the body of another, are not formed into similar ones in the intestine, but are taken up by the bloodvessels and deposited in a solid organ, as the liver, where the first stage of development into a cyst occurs. If this should again be eaten by another animal, then the perfect worm is produced. It has thus been shown experimentally that the *cysticercus fasciolaris* which inhabits the liver of the rat (a specimen of which you see here),[2] if eaten by the cat, develops into a tapeworm. And again, that the ova of this, if eaten by the former animal, become the cystic worm in the liver. In the same way the tænia, which inhabits the intestine of the dog, and passing out with the fæcal matter, if eaten by the sheep at its pasture, is taken through the circulation into the brain, and becomes the cœnurus cerebralis; this again, being eaten by the dog, becomes the tænia. Experiments on the human subject have also shown that cysticerci may become developed into taniæ; but I am not aware that it has been positively proved that the cysticercus and tænia inhabiting the human body are identical, nor what is the perfect animal corresponding to our ordinary hydatid, or echino-coccus hominis. Although the difference in form between a round cyst and a long worm may appear great, yet such a specimen as the cysticercus of the rat will show how one may pass into another; for you see it has a long body, and has already somewhat the appearance of a tapeworm; and then, as regards the form of the mouth, you know that in both there is a circlet of hooklets which enables the creatures to fix themselves to the neighbouring structure for the purpose of nutriment. The cysticercus cellulosæ,[1] which is found in various parts of the human body, consists of an oval bag or cyst of a thin membrane, containing within it a clear fluid, and from this cyst there protrudes a neck, which is of different lengths in different species, and at the end of this is the head, which, like the tapeworm, has four suckers, and a circlet of hooks in the midst of them; the latter average twenty in number.

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[1] 1986^{55}.

[2] 2589.

The *tænia solium*, or tapeworm, sometimes measures several feet in length, and is composed of a number of segments, each of these being hermaphrodite, containing sexual organs, and discharging innumerable ova. Although these are so far independent, they are all united by their intestinal tube, and gain their nourishment through the head; if the segments drop off, it is merely like the fruit from a tree, the root remaining, which corresponds in the worm to the suckers, which gain nourishment from the intestine. The head which is attached is a long flat filament with a projection at the end; on this are seen four suckers, and in the midst a crown of hooklets; when the animal dies and becomes detached, it is probable that these are lost, for in some which are discharged they are found wanting. You will find numerous specimens on the shelves. Students often inquire, when patients bring portions of worms, whether they are near the head or the opposite extremity: I am not sure that the segments always preserve the same shape at different parts of the worm, but you may consider the animal to be

[1] 2555^{80}.

larger in the middle and tapering at both extremities; that the head consists of one long piece, and those which come next consist of long slender pieces, and that these diminish in length and increase in breadth until the middle of the worm is approached, when the breadth somewhat exceeds the length; towards the tail they again become narrower and longer, but by a different method, each segment being somewhat of a conical form, or tapering at one extremity, and this thin end is attached to the broad end of the segment before it. A worm very much resembling this, but rare in this country, is the *Bothriocephalus latus*, the latter specific term being given because the segments are broader than they are long; but I have just mentioned that in the common tapeworm this is sometimes also observed: the generic name refers to the shape of its head, having a furrow on each side instead of suckers. The place of growth of the ordinary tapeworm is the small intestine; you may remember that the other day we found one occupying several feet of the intestine, stretched out at full length, its head directed upwards, but free and moving about as if seeking for some new place for attachment.

Tricocephalus dispar.—These are small hair-like worms of one or two inches long, the pointed end constituting the head, and they lie curled up as you see in these specimens. They are met with mostly after death in examining the intestines carefully, and it is said that nearly every body contains some in the cœcum; although I have frequently seen them, I cannot say that this is the case. This is a drawing of one which I examined not long ago, and is the male, as it shows at the blunt end a sexual organ projecting from a sheath; the latter, as well as the body, is covered with scales and rings.

Ascaris lumbricoides—is the common worm resembling the earthworm;[1] it is developed in the small intestine, where we not unfrequently meet with it in considerable numbers, but after death (as during life) it may pass into any part of the intestinal canal, as stomach and œsophagus, and pass from mouth or nose. I have read of a case where one got into the larnyx and choked the child; also of another where the worm penetrated the intestine, causing fatal peritonitis; and in another, where a worm passed up the choledic duct into the biliary canal. The anatomy of this animal I shall not describe, as you will find it in books; and I merely refer to the general formation of the tænia that it might be recognized.

&c.

Ascaris vermicularis, or well-known thread-worms, developed mostly in the rectum.[1]

Fæcal Matters.—These are especially worthy of notice when discharged during life, but also on the post-mortem table you may observe their *form, consistence,* and *color.* It is not altogether correct to say that solid fæcal matter is found only in the large intestine, for it may be seen of some consistence at the end of the small intestine; and the fact of *scybala* being present, as well as the color or fluidity of the fæcal matter, should be noticed as sometimes of importance: if of a dark color, it may be due to blood or medicine taken, as iron, and sometimes a chemical test or microscope is required to decide its nature. If blood has been poured out from the stomach it is of a black color, but if found in lower part of bowels, it is of its natural bright hue, or of a brownish color; the presence or absence of bile may also now be observed, as well as during life.

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[1] 2596.

DISEASES OF THE LIVER, PANCREAS, SPLEEN, AND SUPRA-RENAL CAPSULES.

LIVER.

- MALFORMATION.
- HYPERTROPHY.
- ATROPHY.
- CONGESTION.
- HÆMORRHAGE.
- NUTMEG.
- FATTY.
- LARDACEOUS.
- YELLOW ACUTE ATROPHY.
- INFLAMMATION .
  - Acute . . . . . .
    - Idiopathic . . } of substance with abscess.
    - From injury . } of substance with abscess.
    - Pyæmic . . . . } of substance with abscess.
    - Portal vein.
    - Hepatic vein.
  - Chronic . . . .
    - Granular, or cirrhosis.
    - Local changes.
    - Syphilitic.
- INJURY.
- ADVENTITIOUS GROWTHS . . .
  - Hydatid.
  - Tubercle.
  - Cancer . . . . .
    - Medullary.
    - Scirrhous.
    - Melanoid.
    - Colloid.
  - Cysts.
  - Cavernous tissue.

GALL BLADDER AND DUCTS.

- DILATATION.
- INFLAMMATION.
- CONSTRICTION.
- OSSIFICATION.
- CANCER.
- GALL-STONES.

PANCREAS.

- INFLAMMATION .
  - Suppuration, &c.
  - Chronic induration (cirrhosis).
- ADVENTITIOUS GROWTHS . . .
  - Cancer.
  - Colloid.
  - Tubercle.
- OBSTRUCTION OF DUCTS.
- DILATATION.
- CALCULI.

SPLEEN.

MALFORMATION.
HYPERTROPHY.
ENLARGED CORPUSCLES.
PIGMENTARY DEPOSIT.
ATROPHY.
INJURY.
HYPERÆMIA.
FIBRINOUS DEPOSITS.
INFLAMMATION AND ABSCESS.
———————— OF CAPSULE.
LARDACEOUS AND SOME ALLIED DEPOSITS.
TUBERCLE.
CANCER.
MELANOSIS.
HYDATID AND CYSTS.

SUPRA-RENAL CAPSULES.

INFLAMMATION AND ABSCESS.
TUBERCLE.
CANCER.
ALBUMINO-CRETACEOUS CHANGE (Addison's disease).
FATTY DEGENERATION AND ATROPHY.

LIVER.

Malformation.—By this I mean an alteration in shape, by which the whole organ has become one rounded mass, or the lobes have lost their proportional size, &c. Most of these changes occur from previous disease, and if they be very great, and there be no history of any former malady, we may refer the time of it to intra-uterine life, and thus in the liver we see another example of fœtal ailments producing an alteration in the form of an organ during the progress of its growth. Of course the evidence of this is not very clear, as in this specimen of lobulated liver,[1] but when we know from actual experience that the drying up of an abscess, or such destructive disease, will very much alter the form of the organ in adult life, we cannot but think that in a liver like this,[2] which consists almost entirely of a large left lobe, that some morbid condition had caused the atrophy of the other part at a very early period of existence. Although it may be difficult to explain a lobulated condition, except as a purely congenital affection, yet many instances of fissures are clearly due to external pressure. Thus, the transverse depression caused by tight lacing is well known;[3] the organ is lengthened, and appears as if a ligature had been surrounding it; the capsule and peritoneum at the part are generally of a white color, and thickened from the pressure; in some extreme cases, the liver has been so girt round that the organ appears as if it had an extra lobe below. Sometimes the same appearance is met with in working men who have constantly worn a strap round their waists, and in the fissured part, a white patch or corn is observed; occasionally, the marks of the lower ribs have produced permanent indentation on the liver. You may also not unfrequently meet with vertical fissures[4] on the right lobe; these cannot be easily accounted for by any external pressure, and are more probably congenital. I may here allude to cases where the whole of the viscera are laterally transposed, and, consequently, the liver is placed on the left side.

Hypertrophy.—This term was formerly very loosely employed as synonymous with enlargement, but now we generally restrict the term to an actual increase of the original tissue of the organ, and in this sense it is questionable how far the viscera may absolutely grow in size. We know that if one part of an organ is

[1] 1895^{30}. [2] 1895^{10}. [3] 1898^{45}. [4] 1898.

wasted, another increases to compensate for it; and in the case of double organs, as the kidneys, this is constantly seen, but it is not an absolute increase of the whole viscus; the only well-proved exception that I know, being the spleen, which does appear to undergo a true hypertrophy, although I have alluded to the instance of the brain, which some suppose to be occasionally morbidly enlarged. I make no mention here of simpler structures, like the mammary gland, but merely the more important internal viscera. As regards the liver, the only hypertrophy I know of is a compensatory one, affecting some part of the organ when others are wasted, as in the specimen I just now showed you, where the right lobe was atrophied and the left proportionally enlarged, so as to preserve the due size of the ogan. Mere enlargement of the liver is seen in cancer, lardaceous disease, &c.

Atrophy.—This is a condition arising from various forms of disease; there is one presently to be mentioned, styled acute atrophy, and there is also cirrhosis, and other affections which may cause the structure of the organ to waste. There are diseases, however, which do not affect the general integrity of the liver, but merely parts of it, and which may be productive of atrophies. Thus, I have seen a dried-up abscess cause a wasting of a considerable portion, and a similar event from an injury. Local atrophies of structure also exist wherever there has been a local inflammation or a fissure, of which I have spoken; if one of these be cut through, the tissue beneath will be found wasted.

Congestion.—This is a very common condition, and due, generally, to the mode of death, especially to that from asphyxia. Thus, in bronchitis, we find the liver of a dark purple color, enlarged, and its section pouring out large quantities of blood. The latter has been retained in the hepatic veins, and thus necessitating a similar engorgement of the portal circulation. The consequence of this continued congestion, is the nutmeg-liver, presently to be mentioned. You constantly hear congestion of the liver spoken of, during life, as constituting an affection by itself, and it is very possible that this may be the case; the hepatic circulation, no doubt, must be undergoing various alterations under different circumstances of diet, &c., but as a pathological condition to be demonstrated after death, I know nothing of it. I allude especially to the so-called portal congestion.

I might here allude to the white marks so often seen on the liver when the body is opened: such appearances, which have long ceased to attract the practiced eye, are generally at once noticed by the novice, and an explanation demanded. They are due simply to the removal of blood from the surface of a congested organ, owing to some external pressure, as from the ribs, or even the weight of any part of the clothing; you can readily imitate them by pressing the finger on the surface, when a white mark is left, and on cutting through this, the anemiated condition is seen to extend for some distance into the tissue.

HÆMORRHAGE.—An excess of pressure on the bloodvessel from congestion, may cause actual hæmorrhage into the tissue; you will find, however, that this is due, in most cases, to a disease of the blood itself, as in purpura, where there is a disposition to bleeding from all parts. As, however, one very frequent cause of this purpuric state is hepatic disease, hæmorrhage into the tissue will be most frequently found in the morbid organ, and if to this be added a diseased heart, we have the twofold elements present for this condition. Thus in a case of morbus cordis, you generally have a highly congested liver, or an organ in the state called nutmeg, and sometimes (but more especially if the liver be itself diseased) you will find blood actually extravasated into the tissue.[1] In order to prove that this is the case, you have simply to take the end of the water-pipe and insert it into the portal vein, when in a few minutes a stream of water will permeate the whole parenchyma of the liver, passing through the lobules into the hepatic veins, where it may be seen coming out into the vena cava, at first red, but afterwards as colorless fluid. If now a section of the liver be made, it will be seen to be quite white, except in those parts where hæmorrhage has occurred into the tissue.

NUTMEG.—This condition of liver results from long-continued congestion; but probably never, or very rarely, occurs except in heart disease, and especially that of the mitral valve. The true change which takes place is one about which many opinions have been expressed, and especially as to whether it be only a temporary recoverable state, or an organic one. It is probable that the latter is the more correct view, though of no practical importance as regards the welfare of the patient, since the disease can only occur from the long-continued and increasing stagnation of blood which happens in the last weeks of cardiac disease. According to the

[1] Drawing 331.

amount of impediment through the heart, so is the degree of congestion or the stage of the nutmeg condition, being found in extreme degree in the case of imperfection of the mitral valve. It is not quite clear why in bronchitis a similar state should not be met with, but it is rare that we find more than a congestion of the organ; which seems to show that the condition under consideration is associated in some way with the changes found in all the parenchymatous organs in heart disease. The name which is given to it is owing to the resemblance which a section has to a nutmeg, and thus also the term *myristicated*, which some have preferred using. Thus you see three colors—red, white, and yellow—blended together in the form of spots, patches, or short curved lines, according to the direction which the knife has taken in making the section. It is not simply a red and white surface; this you are constantly seeing in simple congestion, especially if there be a commencing fatty degeneration; but the nutmeg liver is firmer and harder, and the dark parts are not merely pink, but deep red and well defined, forming a strong contrast to the white; and then, on close inspection, you also see that there is a yellow element between them. The red parts correspond to the hepatic veins in a state of congestion; the white to the portal system of vessels on the circumference of the lobules, or the anemic part; while the yellow implies biliary engorgement; but this is not all, for if a section be made for the microscope, you will find the secreting cells much altered; thus in the interior of the lobule they will be found containing dark matter, consisting both of hæmatine and biliary pigment, and thus the dark color of the red portion; again, the white part, corresponding to the portal system and the circumference of the lobule, is not merely anemic tissue, but is undergoing a fatty change: you will find the cells filled with fat globules, and thus the opacity of the margin of the lobules, compared with the translucency of the red parts. The stagnation in the biliary ducts is the cause of the yellow portion, and to this is due the jaundice often occurring at the termination of heart disease. When the pulmonary obstruction first commenced, there was necessarily an impediment in the flow through the vena cava and all its branches, and therefore in the hepatic vein; this, of course, necessitated a corresponding stagnation in the portal and hepatic systems of vessels; and, after a certain length of time, a change ensued in the secreting tissue of the lobules, a fatty degeneration taking place on their circumference, while bile and blood pigment collected within them. It still remains to be known whether this is all the change, or whether an exudative material does not occur in the tissue; it is possible that such may be the case, and thus be one cause of the very marked hardness and other peculiarities of the nutmeg condition. I have repeatedly examined these livers, and found the appearances just named, but never very satisfactorily made out any new elements except granular material; and the same difficulty has occurred in the other organs which appear changed in heart disease, nothing more than a congestion being clearly discernible. I may remark that the nutmeg has nothing to do with the hobnail or cirrhosed liver.

Fatty Liver.—I have already said that the nutmeg liver is fatty, and the same may be said of some other morbid conditions; but that which we style emphatically the fat liver, is where the addition of fat to the other hepatic elements is the sole change which takes place. When this is very excessive, a true diseased condition, or degeneration, may be said to be present; but a less degree can scarcely be styled morbid, if we judge from the fact of fat being a normal element in the livers of many of the inferior animals, and also from the discovery of fat in the livers of persons who have died from some accidental cause during the progress of a disease which is in its nature recoverable, and therefore leading to the surmise that a great variety in the amount of fat may be constantly occurring. The proportion of fat in the healthy organ is only two or three per cent.; but what excess above this constitutes a morbid state, I cannot say. In a healthy liver you find this fat forming small granules in the hepatic cells; if it be in excess, they form globules, and in extreme cases the whole cell is filled with oil. In such instances the organ is much enlarged and of a white color,[1] the edges being rounded as if the tissue were crammed to excess with the adventitious matter; at the same time it is of light specific gravity, so that, as in a case we had the other day, the liver may float when placed in water. Less degrees are constantly met with, which you will recognize by the appearance and touch, after some experience; but there are various tests by which you discover the presence of fat: thus the old and rough method, and one which we still employ, is to burn a piece of the organ; you must hold it in the lamp a sufficient length of time to allow the water to be driven off, and while this is taking place, if fat be present, blue sparks are given off, and after a time the piece spontaneously burns, and the oil drops from it, and may be collected on a piece of paper. You may also use chemical means, by placing a piece of the organ in a tube with some hot ether, and then pouring the fluid out to solidify; but the best test is the microscope, for by this means you may tell, to a great nicety, the relative amount of fat present, and whether it predominates in one part more than another; you may find, for example, small flat globules in one cell, or large ones in another, until you discover some entirely filled with oil, the nucleus having disappeared. In these extreme cases you find also free fat in the tissue; but it is diffcult to say whether this had escaped during life, or only during manipulation of the specimen. In most cases of fatty liver which you examine you will find that the degeneration or increase of fat takes place on the circumference of the lobules, and thus in a section a dark black margin is seen around the lobules: this is the rule, though not invariably the case. I can hardly enumerate the number of conditions in which fatty liver may be met with; in phthisis you know it is constantly seen, so also it is frequently associated with scrofulous affections of other organs; and I think it may be said that in all long-standing diseases, especially when occurring in persons who have been long bedridden, a fatty liver may be anticipated: it may also be seen in those who have too much indulged their appetite, and especially in men who have drunk largely of beer; and fat, as I have already said, may be a constituent of various other morbid states of the liver. Generally, a fatty liver is considered to be secondary to other ailments, or at most associated with them in connection with a common cause, and therefore it still remains to be decided how far, when a fatty liver appears to be the most marked morbid condition of the body, it may be looked upon as the primary disorder.

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[1] 1912.

LARDACEOUS OR WAXY LIVER.—This peculiar morbid condition appears formerly to have been confounded with the fatty, especially as it is sometimes associated with it, and found in the same class of subjects—the cachectic and tuberculous. At one time, you know, the recognized changes in organs were very few, and thus only cancer and tubercle were known as taking the place of the healthy tissues; it was afterwards found that fat might occupy them, then fibroid tissue, and now a lardaceous or wax-like substance; and so, indeed, there may be numerous other proximate principles formed in the body which are still to be discovered. I believe that chemists have not yet thoroughly analyzed this substance, to inform us of its composition; but it appears, judging from its rougher characters, to hold a position intermediate between a fatty and albuminous material: thus it is translucent, firm, and soft, like wax or tallow, but at the same time it does not melt by heat, nor is it soluble in ether, but is remarkably inert when the various reagents, as acids and alkalis, are applied to it. Its specific gravity, too, is very different from fat; for, while this is much less than the ordinary albuminous tissues, lardaceous matter is considerably greater. It is found especially and in largest amount in the liver, but very frequently it is met with in the spleen, and more rarely in the kidney; it is probable too, though this is not altogether certain, that it occurs in other organs, under various circumstances; thus, in the brain during softening processes, in degenerating kidney, &c., a translucent material, having no organization, may be met with, in the form of small rounded bodies, which are often called colloid. The term reminds us of the jelly-like matter found in colloid cancer and in the alveolar tumors of the ovary. It is highly probable that these substances are nearly allied, if not in some instances identical; and my own opinion is, that lardaceous matter approaches also very nearly to tubercle, both in the nature of the substance itself, and from the class of subjects in whom it occurs. Thus the gelatinous infiltration (of Laennec), sometimes seen in the phthisical lung, very much resembles lardaceous matter; and, moreover, it is especially in scrofulous persons that the lardaceous or waxy organs are found; in these also we may sometimes see a nucleated fibrous tissue associated with it, indicating the disposition to organization. As it has still to be determined in tubercle or fatty degeneration what is the immediate cause of the change from health, so in lardaceous disease the process is not ascertained. All we know is, that in the scrofulous person, instead of the albuminous products being formed which we style tubercle or simple fatty matters, that, owing to some peculiar cause, the morbid material evolved is neither one nor the other, but lardaceous.[1] It is probably a further change in this matter which develops the so-called amylaceous bodies found in various parts undergoing degeneration.

The liver may be more or less infiltrated with this adventitious matter: when slightly so, the microscope may be required to recognize it; but when excessive, the liver becomes enormously enlarged, almost filling the abdomen, and of great weight: thus, a short time ago a liver of this kind weighed fourteen pounds. You may imagine, from the change of the tissue into a mass like tallow or wax, that the following alterations would occur: the organ is very heavy,[1] the edges rounded and moulded to the form of the parts with which it comes in contact; the front aspect being smooth, the posterior being hollowed for the kidney, and if, as is often the case, it has reached to the left side, there may be also a concavity for the spleen; instead of feeling soft, it is hard and firm, and the peculiar sensation given to the knife when cutting is very characteristic, like that of lard or bacon-rind, whence its name; thus it cuts firm, so that the thinnest slices may be taken off with ease; and if these be held to the light, they will be found translucent, as when a tissue is placed in glycerine; and this is one of the few instances in which you will be able clearly to make out the lobules of the liver; for you know that these do not, as in some of the lower animals, form really distinct portions of the tissue, but are due merely to the mode of distribution and connection of the bloodvessels; they are, however, remarkably well defined in the lardaceous organ. The tissue is peculiarly dry, so that on pressure only a little watery pink blood escapes from the vessels. If the organ be only partially infiltrated, so as not yet to affect its general size, the disease may be recognized by the increased weight given it; thus so different is it from the fatty liver we met with the other day, which floated in water, that portions of the lardaceous liver of which I speak had a specific gravity of 1084. The microscope shows nothing more than a translucent pearly substance occupying the tissue, and having no structure, and undergoing no change by reagents. Sometimes lines of opaque white are seen coursing through the substance; these appear to arise from degeneration of the matter.

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[1] For further details connected with this subject, see *Guy's Hosp. Reports*, series iii. vol. ii. p. 120.

These lardaceous livers are found mostly in scrofulous persons, and especially in the young who have suffered a long time with disease of the bones, whence it has been suggested whether any gelatiniform material might have been taken up from the osseous system, and carried through the body. The other cases in which it is met with are those of phthisis, when it may be associated with the fatty change; it is also sometimes found with cirrhosis, and a consequence of syphilitic cachexia.

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[1] 1896^{25}.

Yellow Atrophy.—This is the term given by Rokitansky to one of the most remarkable affections to which the liver is obnoxious, and which is associated with a rare form of acute and fatal jaundice. You will find some of the earlier observed instances in the first volume of the *Guy's Hospital Reports,* related by Dr. Bright, and others, in Dr. Graves's lectures; since this, numerous cases have been reported. You may know that the disease is uncommon, for during many years' experience here, I have only seen two or three cases. The subject of it is seized with jaundice, accompanied by the most severe febrile symptoms, delirium, vomiting, &c., so that some have looked upon the affection as yellow fever; and after death, which occurs in a few days, or a week or two, the liver is found to have undergone a very great change in appearance: it has shrunken in size, is soft and flabby, and is of a greenish yellow color, though not uniformly so, for combined with the yellow there is generally a part having a reddish hue. The ducts appear healthy, showing no obstruction, and the gall-bladder small and containing only a small amount of bile. The microscope discovers no well-formed cells, but opaque masses of tissue, of dark color, composed of granular matter, pigment, and fat globules; most of the cells being quite destroyed, and their places filled with granules. It thus appears as if the texture of the organ was quickly destroyed throughout its whole substance, but, as no new products are found, such a change cannot be called inflammatory, and I have, therefore, placed the disease by itself. The other changes in the body, in these cases, are not very marked, but in the two or three I have seen, there has been almost a total deficiency of fluid in the ventricles of the brain.

Inflammation.—This may be acute or chronic; we know little of hepatitis in its acute form, in this country, except in its results as abscess, and it is questionable whether it ever occurs as an idiopathic disease in a temperate climate. In cases of suppuration, the adjacent tissue may be found in the various inflammatory stages; and before the pus has actually formed and during the pyrexia, a hepatitis of course exists, but in this stage it is rarely seen; and, as an *idiopathic* affection, perhaps, never in this country. In tropical climates, however, a hepatitis is a common affection, leading to various results, as abscess or gangrene; the former may be cured, or the inflammation may be more chronic and lead to cirrhosis.

Hepatitis and *abscess from injury*, is occasionally met with; thus, a blow producing fracture of the ribs on the right side, I have seen cause an hepatic abcess, and more than once produce a suppuration between the liver and diaphragm, which involved the former.

It may arise also from pyæmia, and be of two kinds: the one when this is of a general character, and the other associated with a local pyæmia affecting the portal veins in connection with dysentery. In *general pyæmia,* as in the instance where death follows an amputation, abscesses may form in any part of the body; as a rule, these are confined to the lungs, and only in exceptional cases is the liver affected. I have, however, very repeatedly seen large abscesses in the liver, and which sometimes produce fatal peritonitis, by bursting. It was stated by Pott, and since repeated, that they are more frequent after injuries of the head, but this I cannot corroborate from memory and without searching through the records. It is thought that some of the elements of pus, or putrid matter, are taken into a vein and carried to the lungs, where they produce a peculiar form of lobular inflammation, which I have already described; and that, if any of these elements should be carried into the general circulation, the other organs, as the liver, may be involved. The difficulty in understanding this process is, that the liver sometimes may be the only organ affected, or the suppuration is evidently older than that in the lung. I have, however, only met with two or three instances of this: in one, it was probable that a blow had been received over the liver; and in the other there was suppuration in the pelvis, which would have given an independent source for the purulent infection.

Besides these cases, arising from general pyæmia and injury, there is another class which is associated with dysentery, and found mostly in those who have been abroad, and supposed by Dr. Budd to be dependent on the intestinal disease, or a *local pyæmia.* This physician observed, that the majority of hepatic abscesses we meet with, is in the persons of sailors who have been in the tropics; and on post-mortem examination, old ulcers are found in the colon, from which fact he was led to consider that a morbid material was taken up by the portal vein, which set up an inflammation and abscess in the liver. There can be no doubt that the observations of Budd are correct, since our own and other records corroborate them; these show that, with the exception of hepatic abscess in connection with the two causes just named, nearly all the examples are in this class of persons and in connection with dysentery, for on looking through our cases, I find only one of abscess in the liver which can be designated by the name of idiopathic, and even here there was the history of a blow preceding the symptoms. In these cases then, although we find the two organs thus affected, it is a question, which stands to the other in the position of cause, and which effect? The difficulty is sometimes caused by the apparent recent ulceration compared with the chronic nature of the abscess, but more especially by the fact of the two occurring together only under certain circumstances. Thus no affection is more common in this country than ulceration of the intestine, and yet it is not followed by hepatic abcess; moreover, in some parts of Europe a true dysentery occurs, and yet no hepatic affection; thus a few years ago several hundred bodies were examined at Prague, who died of dysentery, and yet in not one was the liver affected. It is only in tropical climates where hepatitis occurs that the connection is found, and therefore it seems more rational to attribute the hepatitis to some other cause than the intestinal affection; thus in India it has been observed by our own surgeons, as well as by the French in Algeria, that during certain epidemics a number of soldiers will have dysentery, some hepatic abscess, and others the two together: in the latter case, the doctors seem more inclined to attribute the colitis to the hepatic abscess, than *vice versâ*. I believe, however, the fact still remains, that in persons coming from abroad with hepatic abscess, an ulcerated colon is almost sure to be discovered, or the cicatrices of ulcers; at least my own experience in this respect corroborates Dr. Budd's.

Abscess in the liver may appear in various forms and sizes: thus, if acute, a large portion of the organ will be involved, the matter will be seen almost bursting through the exterior; and within, the tissue breaking up into shreds, and sloughing; the pus penetrating the structure all around it.[1] In the cases which are older, and have come from abroad, the abscess may be encysted, *i.e.*, enclosed in a thick tough cyst formed by inflammatory lymph in the tissue of the liver; in such a case the abscess may be probably of any age, at least in one case I had every reason to believe it had been there for some years. In other cases you find smaller abscesses diffused through the liver, and, proving how the matter is propagated, you find these in the course of the portal veins;[2] thus, on opening the vessels you may discover the matter within them, and in more chronic cases not actually in the veins, but in the portal canals or the cellular tissue around. In such cases you may see the various processes preceding the abscess; before the tissue breaks down, you perceive the lobules in their natural position and shape, but of a yellow color from infiltration of pus; and preceding this, the tissue is of a deep red, and the microscope is necessary to discern the inflammatory cells in it; you find in the liver, as in the lungs, that the pyæmic inflammation is first recognized by a congestion, and the points of suppuration are thus seen surrounded by this deep red halo. In a case of puerperal phlebitis, causing death by pleuro-pneumonia, the liver contained a number of red soft patches, apparently the first stage of the inflammatory process.

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[1] 1900^{25}, and drawing 337^{80}.

[2] 1898^{55}, and drawing 336^{62}.

These abscesses terminate in various ways: thus they may be opened externally by the surgeon, or may break spontaneously either without or within; if into the peritoneum, causing fatal inflammation; more rarely into the colon; and in the two last cases we examined, the abscess burst into the chest, causing in one case sudden death. In this specimen you see it opening into the lung. Sometimes the abscesses may dry up, as in this very interesting specimen,[1] where you see dispersed through the organ masses of white dry matter, the remains of purulent effusion; this appears to have been deposited in Glisson's capsule, in the course of the portal veins. It came from a man who died in the hospital of phthisis, but had been long ill in the Crimea with dysentery, and his colon was found to have been ulcerated throughout, but now, as you see, healed. They are such cases as these where we might suspect idiopathic hepatitis—that is, where the tissue of the lobules is found affected in various parts; for in the more acute pyæmic the abscess is generally very large. Sometimes a single local abscess may dry up, and I have met with two or three instances of this kind; adhesions have formed to a neighbouring part, and a putty-like mass was all that was met with after death; in one case it had caused obliteration of the vena cava; sometimes deep cicatrices are seen, as of former suppuration. In the great majority of cases hepatic abscess is in the right lobe.

Suppuration of Portal Vein.—I have already said that in most cases of general phlebitic abscess, the suppuration has extended in the course of the portal vein, but occasionally, though very rarely, we may find this purely as a local condition; and thus it might be thought that here is evidence of idiopathic inflammation of the liver; in these cases, however, there is always suppuration in the main

[1] 1903^{35}.

trunk, or in Glisson's capsule, outside the organ; whence it appears that the vein is first involved, and the suppuration spreads through the tissue, as you see in this example; the case was very obscure during life, and after death an abscess was found at the fissure of the liver,[1] and this extended throughout the veins; in another similar case, an ulceration of the duct produced by a gall-stone was thought to have set up the inflammation in the first place.

Chronic Inflammation.—Under this head I include those changes which result mainly in the formation of fibrous tissue; suppurations, although of long standing, I have already spoken of under the Acute Changes.

Cirrhosis is the most important disease to which the liver is liable in this country. It is generally described as an inflammation of Glisson's capsule, whereby a lymph is thrown out around the portal vein, and which, subsequently contracting, causes the whole tissue to shrink in the manner seen. There is not proof in many cases that a lymph has been effused, but rather that the whole change is chronic; sometimes however, where the capsule is much thickened, and the organ is closely adherent to surrounding parts, the term hepatitis may with more propriety be used. Cirrhosis is however, in most cases, essentially a slow or chronic affection, and an idea may be formed of its nature by the supposition of a tough fibrous tissue being diffused through the organ, which shall contract and squeeze the parenchyma into a number of nodules. You might imagine, as a consequence of this, that the organ would become hard, and at the same time small, the surface irregular and covered with projections, or hobnails, as they are sometimes called. This you see in this specimen, where also a section within shows similar round masses or nodules, separated by a new tough adventitious tissue.[2] In some instances the knobs are very large, and in others very small, and diffused through the whole organ, the surface remaining quite smooth; so that this form merely shows a granular surface, and the name granular liver has been given to it. It has been stated that the granules vary in size according to the kind of spirit taken which has caused the disease; but of this I have no knowledge. In those who have drunk pure alcohol, producing a wasting of the body, the organ becomes atrophied during the cirrhosis; but in beer-drinkers there is a tendency to the production of fat, and thus the cirrhosed liver is found enlarged, and containing

[1] 1903^{35}.

[2] 1907^{80}, 1908.

a considerable amount of fat. If a cirrhosed liver be carefully examined, the nodules will be found to consist of a number of compressed lobules, and these will be found to have undergone a great change, or even complete degeneration; thus the microscope shows the production of fat and the cells sometimes destroyed, others containing much pigment and biliary matter. In the large cirrhosed livers of fat people, these nodules are in some portions converted almost wholly into fat, and then assume a white color, giving the section a very peculiar appearance. In some parts the nodules may be wholly destroyed, and the adventitious tissue, taking their place, forms a considerable bulk of the organ; and I have seen in one or two instances, a large mass of fibrous tissue form in the substance of the liver. Cirrhosis may be combined, in cachectic persons, with a lardaceous degeneration.[1] Such a morbid process, by which a contractile lymph should spread through a soft organ and squeeze it up into this irregular or nodular form, appears very simple; it has been shown however, of late, by several continental pathologists, that the intervening tissue is not of this simple fibrous character, but that it is highly vascular, and it only requires the liver to be injected through the hepatic artery, to fill the whole of this structure with fluid, and to show that it abounds with capillaries. It appears that, owing to the obstruction of the portal veins, this new development of vessels takes place from the hepatic artery, and thus cirrhosis is not a mere fibrous change or degeneration, as was once thought, but a more complex alteration.

You know that the Glisson's capsule, which surrounds the portal vessel and ducts, continues through the liver, and is in union with the capsule enveloping the organ, and thus it is that the latter is so often found implicated in the process—that is, thickened, opaque, and contracted. It is probable, therefore, that in some cases the disease may commence from without as a peritonitis, in which the investing membrane shall become involved, and subsequently the tissue within, in the same manner as an induration of the lung sometimes succeeds to a chronic pleurisy. That such a process outside the liver shall cause a contraction and an impeded flow of blood through it, sufficient to cause dropsy, I have no doubt; but whether it may actually involve the tissue to produce a cirrhosis, there is more uncertainty. It is probable, however, that here may lie the explanation of those cases of cirrhosis which sometimes occur in young and temperate persons; that the affection has commenced as a peritoneal inflammation, and then the organ beneath has become involved, such as you see in this drawing[1] of a hobnail liver, taken from a girl eleven years of age, who died in this hospital a few years ago.

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[1] 1913^{25}.

Local Inflammatory or Fibrous Changes.—These are not unfrequently met with resulting from a local inflammation or injury. Thus, in cases of gall-stones and inflammation of adjacent parts, the liver may become involved, or as in a case we met with lately, of a man who had suffered for many years with pain in his side since being run over, a large mass of liver was converted into a fibrous tissue; and, indeed, cicatrices and results of chronic inflammation may be found in this organ as elsewhere. Local patches of thick fibrous tissue resembling cartilage are often met with on the surface.[2]

Syphilitic Fibroid Deposit, or Nodules.—Without any of the causes above named, but simply owing to a syphilitic taint, deposits of lymph or fibro-albuminous tissue may occur in the liver as well as elsewhere. In the same way as nodes appear on the bones, and deposits of fibroid tissue in the muscles, so also similar deposits occur in the various parenchymatous organs, as brain, lung, liver,[3] &c. In this specimen[4] of liver, which came from a man suffering from inveterate syphilis, you see the tissue has cicatrices on the surface, and a section through these exhibits the structure below contracted and indurated from the presence of dense fibrous tissue infiltrating the parenchyma; below this are several distinct round nodules like peas: they are hard and dry, and consist mostly of an albuminous translucent material, with a small amount of fibre, presenting, indeed, a very low organizable deposit; they are seen to have been formed in Glisson's capsule. In these other specimens[5] the masses are much larger, but of the same character, and associated with one of them was a similar deposit in the lung, to which I have before alluded.

There are no doubt other changes in the liver to be occasionally met with under various circumstances: thus, in cases of poisoning by arsenic, where the liver has become affected through its absorption, I have seen the organ present a peculiar appearance; in one particularly, I remember, it was pale like a fatty liver, and soft, with a pinkish hue in parts, and here and there an arborescent ecchymosis; this purpuric tendency in poisoning by arsenic I h already spoken of under Heart.

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[1] Drawing 326^{50}.

[2] 1951^{32}.

[3] See *Transactions of Path. Soc.* for drawings of these, vols. viii. and ix.

[4] 1913^{10}.

[5] 1913^{20}.

Injury to Liver.—These are very common, but, as they seld occur without a very severe fall or blow, are mostly fatal by hæm rhage. As I before mentioned, the laceration of the abdomi organs mostly occurs by tearing, due to a stretching of the tiss and thus, in the case of the liver, the most convex parts on its up surface give way, although these are the most protected. If the inj be slight, the surface is fissured or cracked, just as can be artifici produced by violently bending the organ upon itself. If this the only injury, and no great hæmorrhage occur, recovery n take place; for a laceration of the great organs in the body is no means necessarily fatal. Thus, in a case which I exami some years ago, of a man who fell from a scaffold, injuring head as well as abdomen, and where death occurred some wee afterwards from cerebral disease, there was a long laceration in t liver quite healed; and as regards the blood which had escaped fr it, this was seen to have produced a dark layer all over the pe toneum, a part being absorbed, and a part remaining as a pi mental covering to the serous layer, but no inflammatory produ Here, also, are preparations and drawings[1] showing lacerations the liver undergoing repair; and in a case we all lately saw, wh a bullet had penetrated the diaphragm and lodged in the liver, appeared as if a cyst was about to form, to render its presence nocuous. When the liver is directly wounded, it is very often fr fracture of the ribs; this necessitates puncture of the diaphrag and thus often hæmorrhage into the chest. Here is a specim showing a needle in the liver.[2]

Spontaneous Laceration.—I have no well-authenticated case spontaneous laceration; but it may be that such has occurred, for it remarkable how from time to time we hear of instances of injur to some of the abdominal organs arising from violent exerti Thus we have had a case where a man made a violent effort extricate himself from machinery, and it appeared as if he h ruptured the hepatic artery; and at the same time we read of a g who in like manner ruptured her gall-bladder. In this specimen liver,[3] in which you see several lacerations on the surface, it is sa that death took place very speedily after violent vomiting, and t inspection showed a large quantity of blood beneath the peritone which had proceeded from these rents; and this reminds me that I have already showed you a stomach which was said to have been rent during vomiting. I mention these cases merely to state that there is some amount of evidence, though it is slight, to direct your attention to the subject of spontaneous laceration.

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[1] 1948, 1951^{5}, and drawings eight days after injury.

[2] 1951^{48}.

[3] 1949

ADVENTITIOUS GROWTHS.—The liver is very subject to these, like the lung; but the two organs have their own respective favorite tumors.

Hydatid.—This is more common in the liver than in any other organ, which tends to bear out the theory already spoken of, that the ova of the long worm, which may be in the intestinal canal, are taken up by a portal vein, and are then developed in the liver into its first stage of a round or cystic animal. They are generally single in the human subject, and so differ from the multiple hydatid seen in the livers of the sheep and other creatures; the cyst may be of all dimensions: it may grow as large as the head, and contain several pints of fluid; or it may die when young, and never exceed a very small size. These dead hydatids are constantly being met with on the post-mortem table, in cases where their presence has never been suspected.[1] The hydatid itself consists of a thin pearly white translucent membrane, so soft that it will not bear its own weight when lifted from its position; this contains a fluid like water of very low specific gravity, seldom reaching more than 1010, and containing a little chloride of sodium, and only the slightest degree of opacity is communicated to it by boiling. This cyst generally contains a number of smaller ones of a similar kind and of all sizes. The large parent cyst, or sac, is contained within a hollow formed in the liver, but having no connection with it, thus the hydatid drops out when the hepatic cyst or cavity is opened; the latter is formed in the liver itself, in the same way as the wall of an abscess, by a fibrous induration of the hepatic tissue around the hydatid. As this grows, so the hepatic tissue gives way and becomes hardened, to form a cyst around it. It is remarkable how, when the hydatid grows near the surface of the liver and protrudes, that the hepatic cyst is protruded also, and thus appearing as if it were formed around the hydatid by some independent process of its own. This outer sac, under these circumstances, often becomes very hard or bony; that is, earthy matter is deposited in its walls. When found accidentally, hydatids are mostly dead, and then the cyst has shrunken together

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[1] 1941, &c., and drawing 347^{27}, &c.

with the smaller ones within it; these, instead of floating in t
parent fluid, are all bound tightly together, and, as might
imagined, under the circumstance of a number of collapsed sphe
being pressed together, they encircle one another as so many cr
centic membranes. In these cases the membranes have degen
rated, and a quantity of fatty or putty-like matter is found amon
them. If the hydatid sac be placed beneath the microscope, it
found to be structureless, but having a number of linear markin
upon it, so that I think it can generally be recognized. It is t
contents, however, of these cysts—a number of little animals,
echinococci as they are called—which form the remarkable obje
for the microscope. On the inner surface of the cyst these bod
grow in bunches as from a stalk, and it is said are enclosed in a lit
membrane; and I may here remark, that before these were acc
rately described, they were recognized by Dr. Bright as you w
see them figured, though very vaguely, in the first volume of o
Hospital Reports. By scraping the inner surface, if they be n
loose within the cyst, you will procure them for examination, a
find them to consist of oval membranous bodies, having at one e
the pedicle of attachment, and at the other a head encircled with
crown of hooks. This head is generally seen within the body, b
in the dead animal it is found protruded. The hooklets consist
hard mineral matter, curved and pointed, and having at the ro
another small projection. It is important to recognize these, for
dead hydatids the membranous cysts may be broken up, or ev
suppuration may have involved them, and then the only means
which we recognize the character of the disease is by the hooks
teeth. As regards the names given to these parasites, I may ju
inform you (as our medical terms often puzzle students more th
the diseases and objects themselves) that you will often find t
hydatid of the liver receiving different names: thus the term *aceph*
locyst was the generic name, and after the discovery of these sm
animals within certain of them, those that contained them we
styled by the name *echinococcus hominis*, and the animals with
the *animalia echinococci*. You will find the parasite so named
Owen, and still is by some. More generally, however, the pare
cyst is called acephalocyst, or simply hydatid cyst, and the anim
within the echinococci.

The most usual termination of a hydatid is to cease to gro
die, and shrivel up; if not, it tends to escape, rarely on the surfa

but more generally into the lung, of which I have already shown you some specimens. In this case you see the whole hydatid cyst has escaped into the chest; we had a case lately in the hospital where it burst into the duodenum, and the cyst was brought up from the stomach and passed away by the bowel; this is, however, a rare occurrence. Instances are recorded of their passage into the pericardium and into the hepatic ducts, and more rarely causing hæmorrhage by laying open adjacent vessels.

I have already said that the tapeworms are the perfect animals, of which the cystic or hydatids are the immature, but that it has not yet been shown what further stage of development the one under consideration undergoes. I have looked in very many cases to see if tapeworm exists in the intestines, and never in any one instance has one been found; and this so far agrees with the observations of the experimenters, that the worm undergoes its stages of development in different bodies.

Tubercle.—This is not very common, and rarely seen except in cases of acute general tuberculosis; you must not call every amorphous yellow material you see, and which may be merely the remains of some purulent matter, by this name; for it does not occur in this form, but as very minute grains scattered through the tissue of the organ. It is thus probable that the inexperienced might overlook it, and may be more common than is supposed. On minute examination, the surface, both without and within, may be seen minutely granular, and this is due to the presence of very small tubercles in the tissue. In a case of this kind which I very carefully examined, the deposit could be traced in the course of the portal vessels, as a soft irregularly formed matter. I think you will scarcely be able to discover their presence in these preparations; occasionally the deposit exists in masses the size of peas, and these soften, containing a yellow fluid within them.

Carcinoma.—This is a very common affection of the liver, but rare as an idiopathic disease, although very commonly spoken of as if it were so; indeed, on looking through the records for some years, I can scarcely find one unequivocal case. As a secondary affection it is very common, succeeding to the various forms of cancer of the other abdominal organs, and is a very frequent concomitant of cancer of the breast; also, the liver is frequently involved in cancer, having its origin about the gall-bladder, or Glisson's capsule—a very favorite seat of it. In such cases merely the adjacent surface may be involved, but in others the whole organ may be occupied: sometin the greater part of it is filled with very large tubera, and the org greatly increased in size and weight. These masses are seen p jecting from the surface, flattened, or the centre depressed a highly vascular.[1] When cut across they show their mode of grow from a centre, being perfectly round, and by the radiating c racter of the new tissue; the middle is sometimes found softeni and containing dead yellow fatty matter, or even a hollow or c within, as you see in this specimen.[2] There is, however, an earli stage than this, in which you may see the cancer in progress of p duction, the hepatic tissue appearing white, but its natural textu still visible, the lobules being well marked, but firm and of a pea character; this is due, on microscopic examination, to an infiltrati of cancer cells into the tissue, but not yet destroying it, in the sa way as I informed you pus is seen infiltrating the organ prior abscess. As I have already said, cancer is of different kinds a hardness according to the amount of cell growth and character the matrix.

Medullary.—This is soft cancer as elsewhere; on squeezing it quantity of milk-like juice exudes, it is full of bloodvessels, but many instances appears almost destitute of a matrix to hold together, the cells or rather nuclei being simply infiltrated in the tissue. In the larger tubera, however, when the cells are r moved, a shreddy fibrous tissue remains. This form rapidly soften and often breaks into the adjacent vessels and ducts, thus I ha frequently seen the portal canals filled with cancer which had be carried along them. In the last case of the kind which occurr here, that of a woman with cancer about the gall-bladder and adjace parts of the liver, and who was suddenly seized with pain in t abdomen, and quickly died, I found that cancer had entered the port vein, and had been carried throughout its branches in all direction coagulating the blood in its course; thus, on section of the live these vessels were found everywhere obstructed; but I do not kno that this had anything to do with the sudden death.

Sometimes the nodules in the liver are very firm; they emit juice on pressure, but they consist mainly of a firm fibrous networ in which the cells or nuclei are contained; such may be calle *scirrhous*, and a good idea of the disease may be obtained fro these drawings.[3]

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[1] 1922^{36}, ^{48}, and drawing 341^{50}.

[2] 1922^{61}.

[3] 341, 345.

This specimen[1] exhibits a rarer form of disease, which could scarcely be called cancer, had not other parts of the body showed undoubted evidence of it, and is perhaps (though of this I am not quite sure) what some writers have called *reticulated* or *hyaline*. The liver was full of these round nodules, of a white almost translucent appearance, and as hard as cartilage. No juice could be squeezed out, and the microscope showed the tissue to be almost structureless, but consisting of a horny matter arranged as a network of long hexagonal spaces, and thus presenting a honeycomb appearance. This was even visible to the naked eye in the centre of the tubera.

Melanosis.—Wherever this exists to any extent in the body, the liver is liable to be affected, and thus we have several specimens[2] showing this disease.

Colloid.—This probably never occurs in the liver as a primary disease, but the organ is sometimes involved when the peritoneum is affected, as in the beautiful specimen I have already showed you.

Cysts.—Besides hydatids, you will find sometimes upon the surface of the liver small cysts with very thick walls, as you see here; sometimes they may arise from *obstructed ducts;* thus in the case I just now showed you, where there was a chronic induration of a part of the liver from injury, a duct was obstructed, and within there was a large cavity filled with inspissated bile; and this appears to be the cause of the cyst in this preparation, and also as seen in this drawing.[3]

Cystic disease is seen in this very remarkable specimen[4] associated with a similar cystic disease of the kidney. You see this portion of the liver which is preserved is full of cysts of all sizes, some as large as a walnut, and others smaller; they are separated by their membranous partitions, and on careful examination of the ducts I cannot discover that they are in any way connected with them. Cruveilhier gives drawings of livers containing cysts, and which he thinks depend on the dilatation of the ducts; such may no doubt be sometimes the case, but the present specimen appears a real cystic disease such as occurs in other organs.

Here is another specimen containing very minute cavities or cysts, but whether a pathological condition I am not quite satisfied, for I should remind you that in very rapid decomposition a very similar appearance may be produced from the development of gas in the

[1] .

[2] 1931^{20}, 1937^{40}, &c.

[3] 1951^{56}, and drawing 339^{50}.

[4] 1909^{40}; and see the details in vol. vii. of *Trans. of Path. Society.*

tissue: thus a liver some of you saw the other day resembled a mass of dough, and looked very much like this.

Cavernous or Erectile Tissue.—We have several specimens on our shelves called blood tumors, and supposed in some instances to have resulted from injury, but they are in reality distinct formations or growths of a cavernous tissue; in this[1] you see merely a red tumor; but in this other,[2] where the blood has been washed out, a very beautiful reticulated structure is left. They are mostly met with on the anterior edge of the liver, where I have several times seen them; they are about the size of a marble, and of deep red color; when cut across you see a cell structure, the spaces being filled with blood, which comes from the portal vein, with which they communicate. These spaces are distinctly visible, and by a magnifying glass appear more or less regular, and of oval shape with tendency to the hexagonal. It has been stated by Rokitansky that such cavernous cysts have a cancerous origin; and there can be no doubt that cancer in the liver may have a reticulum of this kind; but in many instances I have seen it without cancer, although in one case, where this disease existed in the abdomen, there was a cavernous tissue of the kind containing cells, and thus appeared to bear out his view.

GALL BLADDER AND DUCTS.

DILATATION.—This is the condition which follows a closure of the hepatic or common duct, in fatal cases of jaundice. Behind the obstruction the ducts become enormously dilated, so that they may be seen projecting from the surface of the liver; and they appear, when opened, as large as the fingers of the hand, and very frequently pouring out fluid to the amount of half a pint. This is not bile, for the secretion has been much impeded; that which has formed has again been taken up into the blood, but the ducts are filled with a clear white viscid fluid—in fact, mucus, which has been thrown off from the walls of the ducts themselves. You will see in this specimen how enormously these become dilated.[3] The liver in these cases is of a dark green color; and it was stated by Dr. Thomas Williams some years ago, in our *Hospital Reports*, that the secreting cells became destroyed; now, I cannot help thinking that he was

[1] 1909^{26}.

[2] 1909^{20}.

[3] 1951^{64}, and drawing 348^{80}.

observing an exceptional case, for only in one instance have I found the statement to be correct. The cells may be altered, but not destroyed.

In the same way the *gall-bladder* may become immensely distended; this, however, is not usual, though its size varies in many forms of disease: thus, where little food has been taken, or in actual starvation, it is found very full of bile. In an example like this,[1] where it is much distended, an obstruction existed to the discharge of its contents into the intestine; and a case occurred here a few years ago, where the gall-bladder held more than a pint of fluid. Cases are recorded where, from injury and subsequent fistula, the bladder has discharged itself externally, and bile has been poured out to the amount of eight ounces daily for a period of several months.

INFLAMMATION.—*Acute* inflammation of the ducts has sometimes arisen from injury, and has occurred in cases of general suppuration of the liver which has involved these parts. It is not common as an idiopathic affection; but a few years ago I had an opportunity of seeing the case of a man who died of jaundice, with severe febrile disturbance, after a fortnight's illness, and all we found was a general inflammation of the bile ducts, which were everywhere filled with mucus; and in the gall-bladder there were a few gall-stones, and therefore these might have been the exciting cause. As a *chronic* affection it is probably more common, especially where the ducts contain gall-stones, or are obstructed.

Ulceration of the gall-bladder and ducts is not unfrequently met with, and no doubt gives rise to many important affections; thus the presence of a gall-stone in a duct may set up suppuration in its coats, and, this being continued to the portal vein, the whole liver may become involved in the process; this is, no doubt, the most frequent source of this form of disease. In the last case of the kind we had here, there was a large ulcer and perforation of the gall-bladder by a gall-stone, and a local abscess between the liver and kidney. Here you see specimens of gall-bladder, showing ulcers,[2] cicatrices, and perforations. Occasionally a gall-stone has made its way directly from the gall-bladder into the duodenum, at least this is the explanation we give of a condition I have once or twice seen, of the fundus of the gall-bladder opening direct into the intestine.

[1] 1954. [2] 1956, 1958^{60}.

Chronic Inflammatory and Cancerous Contraction of the Gall Ducts.—I shall speak of these together, because they form the most important disease of the parts under consideration, and because, also, they cannot be conveniently separated. As I have repeatedly before said, a simple fibrous inflammatory tissue is one thing, and a cancer composed of cells is another; but between these there are many varieties and combinations; and such growths, impeding the gall-ducts, constitute nearly all the fatal cases of jaundice. It is remarkable, however, that gall-stones are constantly found associated with these diseases, and are met with in the contracted portions of the ducts or gall-bladder;[1] and it thus becomes a question how these two affections are connected, and if as cause and effect, which is the former and which is the latter. Does the presence of a calculus so irritate the ducts that a new product is formed around it, or does obstruction to the flow of bile lead to its inspissation and formation of a gall-stone? An answer to the question involves the very wide inquiry as to injuries and various causes of irritation producing new growths and cancer, and about which, very opposite opinions prevail; I for my part, both as regards the general question and this one in particular, am disposed to place the source of irritation as the *primum mobile*, and the new tissue as the consequence. Thus I think, as a result of stone in the gall bladder or ducts, a change takes place in their walls, and in the areolar tissue around them, and then, according to the constitutional tendency of the patient, a material is thrown out which shall be of a simple fibrous character, or purely cancerous. In a case not long ago examined, of a man who died of jaundice in a most wretched state of emaciation, with the body of a dark-green color, presenting the most malignant aspect you can conceive, we found the gall-bladder contracted over a number of small calculi, the duodenum closely adherent, and the cellular tissue around indurated, and causing complete stoppage of the common duct, and no other disease in the body. In some cases you will find all these parts adherent in like manner, but the new material in Glisson's capsule is in greater quantity, and some of the glands around are enlarged, and perhaps even the edge of liver is involved; the new tissue is hard, consists mostly of fibrous tissue, with a few nuclei, and you will be puzzled to know whether to call the disease cancer or not. It has been much the habit hitherto to designate all these fatal obstructions of the gall-ducts cancerous, but I know not why. In another case you will find the same parts involved, and perhaps with it the liver, and here the new growth may present more of the characters of cancer; and in a fourth case you will see tubera in the liver, exhibiting well-marked appearance of carcinoma. Sometimes it is difficult to know whether the disease is simply fibrous, or fibrous cancer; thus you see this immensely thickened gall-bladder,[1] which was entirely occupied by a calculus, and the same thickening of the walls continued up through the main ducts. Where cancerous growths are seen springing up from the mucous membrane, as you perceive in this gall-bladder,[2] the disease, of course, is primary: in this[3] you see a beautiful villous growth. On the other hand, constriction of the ducts may occur simply from impacted calculus, as you see in these preparations,[4] in one of which the stone is making its appearance in the duodenum. In this[5] you see large calculi in the ducts of liver itself.

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[1] 1922.

OSSIFICATION.—Occasionally we find a calcareous degeneration of the gall-bladder and ducts: the inner surface of these being covered with white deposit of carbonate of lime; this is seldom to any extent, or approaches to what is seen in the liver of sheep or the ox. Thus, in this specimen from the latter animal, you see the ducts forming rigid long tubes, and within them are these flukes[6] (distoma hepaticum); but whether the parasites are the cause of the disease I cannot say. In speaking of parasites, it has been stated that the ascaris lumbricoides has occasionally penetrated the gall-ducts; and the proof that the worm had crawled there before death, was the fact of its having caused an abscess around the part where it was located.

GALL-STONES.—The cause of the production of these calculi has never yet been clearly ascertained; they are constantly met with when the liver is quite healthy, which we know also from the fact of many persons being in perfect health after passing them; they may, however, coexist with cancer, cirrhosis, and other diseases, their tendency to production increasing with age. They consist of elements of the bile, and we can easily imagine how these might form concretions from some change or decomposition of the fluid, whether this occurred spontaneously, or from disease of the coats of gall-bladder. The constituents of gall-stones are cholesterine, bile pigment, and earthy matter: the two last combine in a definite

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[1] 1903^{85}.

[2] 1963^{60}.

[3] 1955^{25}.

[4] 1966^{70}, 1961^{30}.

[5] 1966^{75}.

[6] 6532.

compound called pigment-lime. Some calculi are formed of
cholesterine, and then constitute very beautiful translucent cr
line bodies. In other calculi this substance may be seen as
ling pearly plates, or if not visible, may be procured by boiling a
of the stone in alcohol, and pouring the solution on a slide,
the crystals readily form; they are easily recognized by the
scope as rhomboid plates, lying one over the other, and havin
angle often wanting, the two perfect angles at either end being
and 80.° Most gall-stones, if of any size, are composed of
matter, pigment, and cholesterine; and if one be split across
seen of a brownish color, and formed often of concentric layers
pearly plates glittering amongst them; the centre is often bla
of pure pigment, and from this some radiating lines may be
A combination of all these substances is the most common
sometimes the calculi are black, as if composed of pure pigme
other times of a whiter color. Sometimes you see the gall-bl
full, as in these examples,[1] and the calculi polygonal, from the
tion of one against the other, or rather, I believe, in many inst
simply from their compression against one another during
increase. More rarely they are found in the ducts of the liver
have already shown you, but if so, they may put on this irre
branching shape. As regards the cause of their formation, we
nothing positively, but I think it can be easily seen how very r
they might be produced; I have said that the cholesterine, pig
or biliverdin, which constitute calculi, are also ingredients o
bile, and therefore it can be readily perceived how, if once a nu
existed, a precipitate and concretion would result, in the same
as the urinary ingredients form a calculus around any foreign
in the bladder; and if there should be no such cause, we can se
a change in the constitution of the bile might lead to a precip
for, besides the substances already mentioned which exist in
there is another, its principal constituent—a resinous substan
the *bilin* of Berzelius, which is now known to be a compound
called the cholate of soda (glycocholate and taurocholate); if
of this salt be added to a gall-stone, it will cause its sol
whence it can easily be understood how any cause operating,
in liver or walls of gall-bladder, to alter the character of the
tion, and destroy or lessen the amount of this peculiar prin
would tend to the precipitation of the other ingredients; wh

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[1] 1953, 1960^{75}.

such method is in operation for the production of gall-stones, I do not know.

PANCREAS.

Diseases of the pancreas are not very common; I mean those diseases which are connected with great structural changes, such as are so frequently met with in the lungs and elsewhere. It is very probable, however, that more minute alterations in the secreting structure may be constantly occurring during life, and productive of symptoms in the same way as variations in the secreting tissues of the stomach, &c.

INFLAMMATION.—Although I say it is probable that changes may occur in the secreting tissue more or less allied to those styled inflammatory in other organs, yet the more marked effects, as suppuration, are not often seen. I have met with *abscess* on more than one occasion around the pancreas and involving it, but it was probably only secondary; we have also specimens on our shelves styled *gangrene* of this organ.

Chronic Inflammation and Induration.—This is not an uncommon affection, and its importance not inconsiderable, for it might lead to evil results in two ways: one by so hardening and altering the pancreas in shape so as to compress the portal duct, and the other by damaging the tissue of the organ itself. As regards the first, you know it is generally stated that scirrhous disease of the head of the pancreas is one of the causes of pressure on the bile ducts, and consequent jaundice. Many years ago I was shown several such instances, but from my own personal observations I must state that I have never yet seen an undoubted case of the kind, *i.e.*, jaundice produced by such means; the nearest approach to it was a case where a cyst existed in the pancreas and produced some amount of pressure. The connection between fatal jaundice and induration of the pancreas is simply, I believe, this, that the chronic inflammatory change which affects Glisson's capsule and the neighbouring parts also involves the investing membrane of the pancreas and the cellular structure which pervades it; consequently the organ is affected as the liver is under similar circumstances; in fact, *cirrhosed.* It is extremely hard, quite deserving the name scirrhous, and, therefore, the less the name cancer; the capsule is very thick, and dense fibrous tissue is found pervading it in all parts; how far this may affect the secreting tissue and function has yet to be discovered; but in some cases which I have seen it must have done so to a serious extent. The jaundice in these cases is always due to the constriction of the hepatic ducts, and not to the mechanical pressure of the hard pancreas; at least this is the result of my own observations; the impeded function of the latter organ, no doubt, aggravating the symptoms of wasting, &c.; and this will quite afford an explanation to the remark you often hear as a quotation from Sir A. Cooper, that in the extreme forms of jaundice, with skin of a green color and great emaciation, the cause of the disease is a scirrhous pancreas. Such, no doubt, this observing surgeon had found, but the explanation is, I believe, as I have stated,—a disease due to the thickening around the common choledic duct, by which the pancreatic secretion is also retained, or to an induration or cirrhosis of the pancreas by which its function is destroyed. The effect of a simple pancreatic disease I have seen in a case from which a specimen before me was taken, where death occurred without any other symptom than the direst emaciation. In these specimens[1] you see the pancreas indurated from disease around it, and in this one[2] atrophied.

As you may sometimes find the pancreas involved in any suppuration which may be going on near it, so you may find the remains of inflammatory products within it. I have more than once seen the pancreas occupied, as you see here,[3] with white amorphous matter, the remains of pus or other inorganizable exudation; in one case this was connected with a perforating ulcer of the duodenum, which was undergoing cure. You may also find the pancreas locally involved in chronic ulcer of the lesser curvature of the stomach.

Cancer.—This naturally comes next after what has been said, and I may here repeat that in the majority of instances of disease about the fissure of liver, pylorus, lesser curvature of stomach, &c., where the pancreas is found very hard and styled scirrhous, the nature of the disease is, as I have told you, chronic inflammation, or *cirrhosis*, and not cancer, for it is remarkable how the pancreas escapes even where cancer exists around it. Thus in cancer of the stomach, this organ may be dissected off, together with the diseased lymphatic glands, and be found quite untouched; this is the rule, and cancer of the pancreas the exception. Sometimes, however, it may be affected by contact, and, more rarely, separate deposits of cancer are found within it, such as is seen here.[4]

[1] 1989^{50}, 1991^{32}. [2] 1987^{64}. [3] 1987^{85}. [4] 1989^{10}.

Colloid.—This case of colloid of the pancreas[1] is interesting, as it only involves half of the organ, and the body otherwise was perfectly healthy, and yet it caused a slow death by the most excessive emaciation.

Tubercle.—I have already told you that a local suppuration is sometimes met with about the lesser curvature of the stomach without a very evident cause, and remains of cured abscess I have twice met with in this region. A few years ago I had a patient at the Surrey Dispensary, who, after being ill some time with very obscure symptoms, died suddenly of peritonitis; this was due to the bursting of an abscess into the abdomen from the region of the pancreas. This organ was infiltrated throughout with white cheesy-looking matter, both firm and soft; at the time this was called scrofulous matter, and I therefore now allude to it, but it was probably a simple chronic inflammatory product, and might have been connected with some overlooked ulcerated gall-duct.

Obstruction and Dilatation of Ducts.—I have already mentioned that such conditions are very common. In cases of constriction of the common choledic duct in jaundice the pancreatic duct is also involved, for, as the hepatic ducts are necessarily dilated behind the stricture, so is the pancreatic, as you see in this specimen.[2] Occasionally *cysts* are formed, as this preparation shows you,[3] and one I met with not long ago was as large as an egg, and contained a white viscid fluid corresponding to the pancreatic juice.

Calculi.—As these may form in the salivary glands, so they sometimes do in the pancreas.[4]

SPLEEN.

Malformation.—It is not uncommon to find the spleen malformed; thus, if you look on our museum shelves you will find some fissured, some lobulated, and others multiple, that is, made up of a dozen or more small organs. These are merely connected with one another by bloodvessels.

Hypertrophy.—This is probably the most important disease of the spleen. In speaking of other organs I stated that it was very doubtful if true hypertrophy ever occurred, and that in them the term was only used in the case of one portion growing larger in consequence of another becoming smaller, and that in the case of

[1] 1990^{55}. [2] 1988^{50}. [3] 1991. [4] 1991^{80}.

double organs, as the kidney, the hypertrophy of one was merely to compensate for the atrophy of the other, and I have already mentioned any doubtful exceptions to this. In the case of the spleen, however, a true hypertrophy does appear to take place, the organ enlarges to its utmost limit, and apparently by an increase of its natural constituents. A simple enlargement I am not speaking of, for in various diseases this is met with, and is due merely to some increase of blood or other temporary cause; nor do I allude to the ague-cake arising from miasma, for this, I believe, is a mere temporary enlargement, and not hypertrophy, as is proved by the fact which we almost daily witness here, of patients with intermittent fever on removal from their miasmatic abode, and under appropriate medicine, having their spleens return to their natural size in a few hours. Nor do I know that a prolonged miasmatic influence tends to permanent increase of size; it may be that various visceral diseases result from a continuous poisonous effect of this kind, but in all the cases I have seen of simple cases of hypertrophy there has been no history of any aguish influence; I allude especially to those cases where the blood contains such an excess of white globules as to obtain for the disease the distinctive name of *leucocythemia.* This is the affection I allude to under the name of hypertrophy of the spleen, and which, without any other complication, is itself sufficient to lead to a fatal issue. In these cases, if you examine the blood from any part of the body, you will find the white corpuscles equal the red, or even exceed them in quantity, the patient dies exhausted, and often after repeated hæmorrhages, and all you find after death is an enormously enlarged spleen, weighing several pounds,[1] and reaching to the pelvis and to the mesian line. On examination the tissue presents no morbid appearance, the section being dry and firm; at times the corpuscles are larger than usual, but in the few cases I have examined I have not been able to make out even this, or that any new tissue has been present; the disease appearing to be a simple hypertrophy, and death due to the over-action of a particular function of the body.

Enlargement of the Splenic Corpuscles.—We find great varieties in the size of these bodies in different cases, but I feel a doubt as to their having any pathological significance. Experiments have shown that these corpuscles, or malpighian bodies as they are sometimes called, vary with the stage of digestion, and this will sufficiently account for the various sizes they present to the eye, sometimes being large and at others not or scarcely visible. The only point of interest respecting them is, their very great size in these organs from some fatal cases of purpura which occurred a few years ago.

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[1] 1996, &c.

Pigmental Changes in the Spleen and other Organs as a Result of Intermittent Fever.—I may take this opportunity of mentioning to you the very remarkable observations made by some continental pathologists in reference to this subject. Vogel has shown that in persons who have died of intermittent fever the spleen has been found of a dark color, from the presence of pigment, and that the blood has contained similar coloring matter. It has been shown also that other organs may be similarly affected, and Frerichs, who is now on a visit to London, informs me that, having paid especial attention to the subject, he has found all organs of the body discolored in those who have died of intermittent fever; indeed, wherever the pigment circulates there it will collect in the capillaries, and thus the brain, liver, kidneys, &c., may be found containing it. I mention the subject under Spleen because this organ is intimately connected with intermittent fever, and we have long recognized the existence of anemia and diseased state of the blood in splenic disease; but at the same time I do not know that this pigment deposit is due to any derangement of the spleen, or whether it may not arise from some primary affection of the blood, though probably the former is the case. I have not a specimen to show you of this affection, but here is a drawing of a brain from Bright's *Medical Reports*, which undoubtedly represents this affection. The case is here described as J. C., an old man, who, accompanied by his wife, set out from Horncastle, in Lincolnshire (an aguish locality), in August, 1829, for London, and, having walked allt he way, fell ill immediately on his arrival, and was brought to the hospital in a dying state, apparently with fever. On post-mortem examination the brain was found as here represented, having its surface or cineritious structure of the color of black lead, but the section showing the medullary part unaffected, except the puncta vasculosa, which were also of this dark color. Within, the corpora striata were found of the same blackish color, and the vessels were filled with dark blood. The spleen was also of a dark hue. The wife's brain and other organs were also dark, though less so than those of her husband.[1]

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[1] The decease of Dr. Bright since this was written compels me to remind the student of the merits of this great physician, which serve for the imitation of us all. I allude to his

Frerichs has also found the liver of a dark color, and which, if closely examined, is found to contain pigmental granules in the cells; in the kidney also the malpighian bodies have been found filled with pigment: the spleen and brain I have already alluded to.

ATROPHY.—Besides finding the spleen immensely enlarged, we may meet with it shrunken; this is especially the case in old persons, where the capsule is also thickened. I do not know that any of the tissues in these cases have lost their natural characters; but one can scarcely look upon such a small wasted organ, and believe it to be competent for the functions of the well-formed viscus. What the symptoms are, if there be any, attendant on such an atrophy, I do not know.

INJURY.—This is not uncommon in injury to the abdomen; if the vein be opened, the blood may drain from the vena portæ, when, the first thing noticeable is the black pitchy character of the blood effused. It may be torn open from a violent stretching of its surface, or may be transfixed through the diaphragm by fractured ribs. Injuries of the spleen are by no means fatal, for cicatrices may sometimes be found on them; and in cases of accidents from falls, &c., which are not immediately fatal, and the spleen has been lacerated, the various stages of repair may be seen. Here is one with lymph on the surface a week after the injury.[1]

I have already alluded to reported instances of spontaneous laceration of the stomach and liver from violent efforts during vomiting; but there can be no doubt that the spleen may give way from undue distention, as occurs in intermittent fever, as there are many authenticated cases of the occurrence. That which, however, is perhaps more frequent in India and hot climates is, that persons suffering from this morbid enlargement receive a slight blow, and this is the immediate cause of the rupture.

HYPERÆMIA.—The variations in size of the spleen are especially noticeable, since they are very common. It cannot be always ascer-

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truthfulness, and his publication of all the facts relative to the cases which came before him; even without knowing their import or that they contained any discovery. This he did in his account of renal disease; subsequently, in describing pancreatic disease; and now, after thirty years, we can make use of one of his cases, of the pathology of which he was ignorant, but of which he gave all known particulars, even to the place whence the patient came, which is now the most important part in the history, and yet, probably, been read by hundreds of persons without any conception that the mention of such a fact could bear on the nature of the case.

[1] 2018.

tained, however, what these signify: whether they be merely due to a temporary congestion and enlargement, or to a morbid alteration in structure. It is probable that very often the mere size is due to a temporary cause, and the mode of death. In disease of the liver, as cirrhosis, the spleen is large, as might be imagined, although I have seen the opposite statement made; in persons who have died, who have been subject to an aguish influence, the spleen is found large as during life; but I have never been able to discover that any alteration in structure has taken place. In fever the spleen is large and soft, and is stated by some to contain a morbid deposit; but this I have never been able to detect.

Fibrinous Deposits.—In some affections of the heart, accompanied by long-continued congestion of all the organs, the spleen suffers as the other viscera. It becomes, like the lungs or kidneys, remarkably hard, so that if shown a spleen of this kind, you would at once recognize it as from a person who had died of cardiac disease; after several days dead, you may find the organ as hard as a kidney. Besides this induration, however, you may often meet with white deposits on the surface of the organ; when cut through they are seen to penetrate the tissue and form conical masses, the shape corresponding to the distribution of the bloodvessels; for if you examine our specimens of injected spleens, you will find that when the small branches have only been filled, the portions of spleen injected correspond exactly with these morbid appearances. I believe, if you could artificially obstruct one of the smaller veins of the spleen, this condition would be produced. A similar deposit is found in the kidneys, in the same class of cases; and it is possible that the condition of lung already alluded to may have some intimate connection with the change in these organs. This deposit is quite white, or yellowish white, firm and smooth like a growth in the organ;[1] but if you place a piece beneath the microscope, you discover that the tissue of the spleen is still present, but a quantity of fibrillated lymph and granular matter is found amongst it; the smaller bloodvessels are also filled with fibrin, and the circulation is obstructed; all around the white deposit is a red line of vascular tissue. Looking at this congestion and the obstructed capillaries, it appears clear that some impediment first occurs in the smaller arteries or capillaries, and that some exudation occurs from them into the tissue; after this has existed for any time it softens, disin-

[1] 2000.

tegrates, and is found to be granular by the microscope. It is finally absorbed, and a depression or cicatrix remains. These deposits are seldom met with but in heart disease, and it is still a question how they are formed; it was once thought that they corresponded to apoplexy in the lung, that owing to the great pressure on the vessels, the blood burst out into the tissue, and the hæmatine being absorbed, the fibrin was left: the theory now more generally adopted is, that some small particles of matter are carried from the diseased valves into the smaller capillaries of the parenchymatous organs, and there cause a coagulation and obstruction, and the subsequent events; this corresponds to a process supposed to occur in phlebitis or pyæmia, only in the latter case the elements are derived from purulent or decaying matter; but in both a morbid material is carried into the circulation, and sets up the process; and in both a congestion is seen around the deposits, only in the case of pyæmia the products are decidedly inflammatory. For these reasons the affection has been styled capillary phlebitis; but there is much room for further investigation of the subject, for I have met with such deposits in cases of morbus cordis, where no vegetations were present, although it is possible that such might have once existed, and been swept off; and another reason why the explanation is not altogether satisfactory is, that there is some more general cause affecting the capillary system of the viscera in heart disease, especially in cases of contracted mitral valve, and even where no vegetations are present, as is proved by the peculiar induration of lung and other organs. If a large part of the spleen be filled with softening fibrin, and the bloodvessel leading to it be occupied by a plug, it may be a question whether a concretion may not have escaped from the valve constituting an emboli, employing a term after modern phraseology.

Inflammation and Abscess.—Abscess in the spleen arises generally from pyæmia. In the majority of cases of this disease the lungs are the only organs affected, but in exceptional instances other viscera may be implicated, as the spleen; in these I am under the impression, though I will not speak with certainty, that the base of the left lung has been the part mostly affected, as if the inflammation had been propagated through the diaphragm by contiguity. Before the abscess appears we find the spleen presenting much the same appearance as the lung—consolidated by inflammatory products of a red color, and surrounded by a highly congested margin.

It is a question whether idiopathic abscess of the spleen ever occurs, although it is not unfrequently found involved in suppuration. Among other cases which are very obscure during life, are some which are found to be due to suppuration in the left hypochondriac region. Circumscribed abscesses in this part I have now seen several times; in some cases it has been due to a chronic ulcer of the stomach. In two or three there has been a communication with the intestine,[1] although whether this has been the primary or secondary affection has not been very clear; and I have seen also one or two instances of suppuration in this region involving the spleen where no such cause could be found. I mention these cases that you may not be unprepared when you meet with them.

Inflammation of capsule of the spleen is often seen, by which adhesions have formed between it and abdominal walls; but this is only one form of the very common peritoneal adhesions. Besides these, the capsule is often found much thickened, or become cartilaginous, as it is said; I have already told you that this condition is really fibrous, and only cartilage-like. It is mostly met with in old people, where the spleen is inclined to be small or atrophied, and it is on the outer side that this thick tough substance is met with.[2]

LARDACEOUS OR WAXY SPLEEN.—I have already spoken of lardaceous liver, and the spleen may be affected in a similar manner. In the case of the liver, however, the whole tissue may become infiltrated with the adventitious matter, whilst with the spleen this is rarely the case, only certain parts being affected; thus, whilst the former organ is much enlarged, the latter is seldom increased in size, or but slightly so. It is generally much hardened, and on section the wax-like or lardaceous matter is seen occupying the splenic corpuscles, which appear as white glistening bodies, about the size of pins' heads; thus scarcely more than a fourth or a third part of the whole tissue is affected, the intervening parenchyma remaining healthy.[3] In early cases of the disease the deposit is not always visible, and requires the section to be placed in water for some hours before the corpuscles can be clearly made out. This waxy spleen is mostly associated with the same affection in the liver, or, if found alone, is mostly in cases of phthisis.

In rarer cases the whole organ is filled with the wax-like matter; it is not visible to the naked eye, but may be scraped off the organ like tallow, and the spleen feels like a mass of this substance. This character and its frequent association with tubercle. Thus, in the more acute form of the disease we find the whole organ involved in a softish, grey, translucent matter, which has replaced the original tissue; this corresponds very much in character to the lardaceous matter of other organs already mentioned, and which I have stated, according to my own belief, to be closely allied to tubercle, and, although sometimes this may be met with alone, it has so often been observed in connection with tuberculous matter in the lungs and elsewhere, that there can be little doubt that the disease is of a scrofulous kind. If the disease has existed for any time, the translucent matter dries up and becomes curdy, or cretaceous, like scrofulous deposit, or sometimes softens into a fluid cream-like matter. It is only in those cases where the disease has been of long standing that the discoloration has existed; in such, after long-continued symptoms, for, perhaps, three or four years, with a gradual prostration of strength and a brown discoloration of the skin, the patients die simply of asthenia.[1]

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[1] 1999.

[2] 2013^{50}.

[3] 2005, 2005^{25}, ^{75}.

TUBERCLE.—Besides the disease of which I have been speaking, there are cases frequently met with of general tuberculosis, where all the organs of the body being affected with tubercle, the supra-renal bodies are also involved to a greater or less extent. Such cases are probably of little importance as regards Addison's disease, for death occurs from the general affection, rather than through one organ.

CANCER, in the same way as tubercle, may involve all the organs of the body; but I do not know that the supra-renal capsules are ever primarily affected with it. It may be, that some of the symptoms existing in such cases may be due to disease of this as well as of other organs, although they are not sufficiently well marked to be recognized.

INFLAMMATION AND ABSCESS.—Where suppuration has existed in the neighbourhood of these bodies, they may become involved, but as only one is likely to be affected, and the disease of an acute nature, it is probably unattended by symptoms. I do not know that idiopathic inflammation and abscess is ever met with, the cases spoken of, where such has been found, have been those already mentioned in which tuberculous matter has softened.

DEGENERATION AND ATROPHY.—The diseases already mentioned are those only which we have hitherto recognized, but there can be no doubt that intimate changes go on in the tissue which are equally important: thus the organs are often found wasted, and at other times contain so large a quantity of fat that it must interfere with their function; and in one case I examined, the supra-renal capsule was converted into a uniform white mass, which on examination showed the tissue to be much altered, and reminded me of a kidney undergoing degeneration; thus, the large oval bodies were scarcely visible, and the columnar or tubular part much shrunken, so that only a very irregular appearance of the structure remained. These minute changes have yet to be investigated, for if it be true that a destruction of the organ by an adventitious product is attended by such serious symptoms, there can be little doubt that minor changes must be constantly occurring, and necessarily attended by effects of a corresponding importance.

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[1] Prep. 2022^{9}, and drawing 353^{17}; melasma 159^{67}; also 2020^{90}, with corresponding drawing of face.

I may be allowed just to allude to the healthy appearance of these bodies, since this is not generally known, and even anatomists themselves have described it differently. Thus, since it is very common for the central part to soften, from decomposition or from great congestion, it was once thought that the organ was hollow, and even when this was found to be incorrect, this central part failed to be described in some standard works of anatomy; it is not surprising therefore, when of late the supra-renal capsules have been diligently examined, the normal medullary substance has been more than once regarded as morbid. If you make a section of a recent organ, you find the central or medullary part composed of a pearly white substance, having a large vein in its midst; surrounding this is the cortical structure, of a yellowish-brown color, but composed apparently of two parts, since its inner margin, which touches the medullary, is of much darker color than the remaining cortical part without it. It is this dark portion which is seen constituting the surface of the cavity when the organ has softened and is laid open. A thin section of a supra-renal capsule beneath the microscope shows a cortical part composed of columns of large oval bodies, while the medullary is a fibrous matrix containing nucleated cells.

DISEASES OF THE URINARY ORGANS.

KIDNEYS.

MALFORMATION.
HYPERTROPHY.
ATROPHY.
INJURY.
INFLAMMATION. { Mucous membrane (pyelitis).
    Substance (suppuration).
    Capsule (perinephritis).
    Tubular or albuminous nephritis . . { Bright's disease.
GRANULAR AND CHRONIC DEGENERATION (various stages)
CYSTIC KIDNEY.
FATTY „
LARDACEOUS „
FIBRINOUS DEPOSITS.
FIBROUS AND OSSEOUS TUMORS.
HYDATID.
TUBERCLE . . . . . { Miliary, yellow, and abscess.
CARCINOMA.
CALCULI.

URETER.

MALFORMATION.
DILATATION.
CONTRACTION.
CALCULUS.
INFLAMMATION.
TUBERCLE.
CANCER.

BLADDER.

MALFORMATION.
HYPERTROPHY.
DILATATION AND SACCULAR.

- ATROPHY.
- INJURY . . . .
  - Wound, from operation or accident.
  - Rupture, from distention or violence.
- INFLAMMATION. .
  - Mucous membrane (cystitis).
  - Cellular tissue (pericystitis).
- TUBERCLE.
- CANCER.
- VILLOUS DISEASE.
- FOREIGN BODIES.
- HYDATID.
- PROLAPSUS.

URETHRA.

- MALFORMATION.
- INJURY.
- INFLAMMATION. .
  - Catarrhal.
  - Gonorrhœal.
  - Plastic.
- STRICTURE.
- GROWTHS . . . . .
  - Vascular (female).
  - Caruncular.
  - Cancerous.
- TUBERCLE.

KIDNEY.

MALFORMATION.—The commonest abnormal condition is the *absence of one kidney;* sometimes there is no trace of it,[1] and at other times some of the remains of the tissue are left; the latter fact suggests the same cause for its occurrence as for numerous other malformations already mentioned—that is, a morbid condition during fœtal life affecting the nutrition of the organ and causing its subsequent atrophy; for in these cases we find remains of the bloodvessels, and the ureter is present, though extremely small. The suprarenal body is perfect, and the kidney on the opposite side is proportionally enlarged.[2] Sometimes the two kidneys are united together over the spine, constituting the *horseshoe kidney.*[3] The junction is always, as far as I have seen, at the lower part, so that

[1] 2026^{20}.

[2] 2026^{10}.

[3] 2023.

the semicircular organ has its convexity downwards, the blood-vessels enter on each side as usual, and the ureters pass down behind it. In the perfect form the union of structure is complete, but in one case we met with the junction was merely by fibrous tissue.[1] The kidneys may become also altered in shape by a curvature of the spine, as you see in this specimen.[2] The *position* of the organs may be irregular: thus, occasionally, one kidney has been found situated over the promontory of the sacrum, as you see here.[3] Lately a German physician related a case where he found a kidney lying loose in the abdomen, or at least so little fixed that its position could be readily altered, and this case immediately suggested an explanation to many of our profession, for those very frequent instances of tumors which exist for a considerable time, then disappear or change their place; and thus we have heard lately of many cases of *moveable kidney*. Referring to my own experience I can only say that I have never yet seen an example of this in the dead body, and, as regards the diagnosis in the living, there are many difficulties in the way of pronouncing positively on the matter, and especially as we are quite alive in this hospital to the subject of Dr. Addison's *phantom tumors*, or those apparent tumors caused by spasm of the muscular parietes, or irregular contraction of the intestines. A very common abnormal condition of the kidneys is the *lobulated*,[4] or the persistent state of that which is natural in the fœtus; the surface is seen to be deeply fissured and divided into distinct portions.

Hypertrophy.—As was remarked of the liver and other organs, a true visceral hypertrophy has not yet been proved to exist excepting in the case of the spleen, for when enlargement of one portion of a viscus does take place it is merely compensatory for the atrophy of another. Thus, if we find one kidney much larger than natural, we discover the other correspondingly small. These organs, however, may be often larger and heavier than usual, from disease, or simply from congestion; the first is seen in many forms of morbus Brightii, and the latter in fever, pneumonia, &c.; in which also there is generally some increased secretion to account for the enlargement.

Atrophy.—The most common cause of atrophy is chronic Bright's disease, an example of which we had last summer, where the kidneys together weighed less than an ounce and a half. Sometimes we find one kidney wasted, or scarcely a trace left, as I just now mentioned. If these be examined by the microscope no tubules are discoverable, but their place is occupied by a number of cysts. I have no doubt that this atrophy arises from some old inflammation and suppuration around the kidney, for not only may traces of such be found, but the subjects of the affection are very often those who suffer from stricture, and are very likely to have had nephritis.

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[1] 2024. [2] 2022^{70}. [3] 2022^{60}. [4] 2024^{10}.

INJURY.—The same remarks apply here as to other visceral injuries; slight lacerations may heal, especially in those cases where the peritoneum has not been injured, and any effused blood has been confined to the cellular tissue of the loin. The injury, however, which is necessary to cause a laceration of the kidney, generally being severe, the fissures would extend into the abdomen and cause death, either by hæmorrhage, or, if any urine escape, by a speedy peritonitis. The latter fluid is one of the most irritating which can affect a serous surface, while blood probably is innocent; at least we are constantly examining the bodies of persons who have died several days after severe abdominal lesions and extravasation of blood, without finding any products of inflammation.

INFLAMMATION OF THE KIDNEYS may be looked upon as including two distinct affections: there is that which is accompanied by the ordinary results, as suppuration; and that which has its progress in the secreting structure of the organ, without these obvious effects. The first form has always been recognized under the term nephritis, and is a disease generally dependent upon a previous inflammation of the bladder, resulting from stone, stricture, &c.; it is a secondary affection, and confined almost to surgical cases. The primary affections of the kidney, or those commencing in the structure itself, whether of an acute or chronic character, were not known until Bright's time; and, as this physician described the principal forms of disease which attacked the organ, it follows that Bright's disease is really synonymous with idiopathic disease of the kidney in all its varieties, and is as extensive in its meaning as any term implying disease of the liver or other organ; we except, of course, adventitious growths and secondary abscesses, and limit the expression to all affections tending to a change of texture, commencing in the glandular structure of the organ itself.

If you read the history of Bright's discoveries, you will see that during his observations on dropsy, he found the urine to be very often albuminous, and this he traced to a particular condition of the kidney; searching then for disease of this organ after death, he soon noticed various other changes in it, where no dropsy existed;

and thus, indeed, he collected together instances of disease of all kinds, none of which had before been recognized: consequently, if you ask me, as you often do, what is Bright's disease, I can only answer, idiopathic or primary disease of the kidney; for this term includes within it forms of disease as opposite to one another as the acute and chronic affections of other organs, and is commensurate with heart disease or lung disease, &c. It does not follow that Bright himself was cognizant of all the changes in the kidney which are included under his name, for he assuredly was not; but I know of no affection of this organ so different from those which he described, that it can be separated from them. Once more, then, I repeat, that Bright's disease simply means kidney disease.

Suppuration.—This is a secondary affection, not resulting from any of the forms of morbus Brightii, or diseases which commence primarily in the kidney structure, but is that which formerly was styled nephritis, with the well-known result, suppuration; it results from inflammation of the bladder, and thus we often call it the surgical kidney, to distinguish it from Bright's disease, which comes under the care of the physician. This, however, is not absolutely correct, for we meet in the medical wards with one form of inflammation of the bladder which often terminates in suppuration of the kidneys; I allude to that resulting from paralysis in spinal affections. In such cases as these, and the analogous cases of fracture of the spine, together with those of stricture, calculus, enlarged prostrate, &c., the bladder becomes inflamed with purulent ammoniacal urine; the inflammation extends up the ureter to the pelvis of the kidney; then an absorption of the purulent elements takes place into the tissue (a more probable process than an extension of the inflammation up the straight tubuli), and a suppuration occurs in the cortical part of the organ. If a patient has died with any of the diseases I have named, you very usually find the kidneys much enlarged, and the surfaces covered with minute points of pus, or small abscesses, and a section may show the whole organ similarly affected, excepting the conical parts;[1] the abscesses rarely reach any size, so as to form a collection of pus beneath the capsule; and I only remember one case where the peritoneum covering the kidney was involved so as to set up a peritonitis; in all these cases the mucous membrane of the pelvis is inflamed in the same way as the urinary passages below, constituting *pyelitis*; this, however may occur without the substance of the organ being necessarily involved. The mucous membrane is red, vascular, covered with a muco-purulent secretion, and not uncommenly by flakes of adherent lymph. Although generally in suppuration of the kidney all its structures are involved, yet in some slight cases the mucous membrane within may alone be affected, and in others it happens sometimes that the surface is more than usually involved, and the capsules and adjacent parts may be those especially inflamed; to such a case the term *perinephritis* has been given. In acute cases of this kind we find the capsule highly vascular, and involved in the process;[1] but it is more especially as a chronic affection, or as a result of a former inflammation, that it is worthy of notice; and to this I direct your attention, because often overlooked. You find, for example, on attempting to take out a kidney, that it is firmly fixed in the loin, so that the organ often slips out of its capsule, which is left *in situ*, very much thickened, and having on its exterior much indurated cellular tissue closely involving the adjacent fat; the surface of the kidney itself is rough or puckered, and perhaps torn by its separation, indicative of the inflammation which has once been present. As this condition is mostly found in the same class of cases where the acute suppuration exists, viz., those of stricture, &c., there can be little doubt that it indicates a former inflammation of the organ, but, of course, less recently than that which is met with in fatal cases; though, from the contraction of the substance of the kidney, it is possible that pus even has been formed. Such process probably accounts for the wasted kidney sometimes met with; thus in a case of stricture I examined the other day, one kidney was much wasted, and this, no doubt, was connected with a very severe illness which occurred eight years before.

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[1] Drawing 355.

I might also remind you, that in some cases of *general pyæmia*, small deposits of pus may be found in the kidney as well as in other organs. A large local primary *abscess* is generally scrofulous, and of this I shall speak presently.

BRIGHT'S DISEASE.—I have already said that this term is almost as extensive as disease of the kidney, for it includes maladies which can be called by no other name than inflammatory, and others which are of the most chronic character. The former do not, as I have said, terminate in the production of purulent matter in the substance of the kidney, although elements closely allied to pus are formed in the tubes, and thus the affection is seen, if we take the analogous case of the lung, to resemble an inflammation of the air-cells or bronchial tubes, rather than a local pneumonia ending in abscess, and which, as in the kidney, is mostly a secondary disease. Thus it is that the term "*nephrite albumineuse*" has been given by Rayer, and "*desquamative nephritis*" by Johnson, in order to distinguish this idiopathic affection from that secondary suppurative form of disease of which I have already spoken.

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[1] 2035^{80}.

In considering the various forms of disease included under these names, we cannot do better, in the first place, than go back to the time when Bright made his discoveries, when we shall see that this physician soon perceived that there were two very different affections associated with corresponding different symptoms: thus he found that persons dying with dropsy and albuminous urine, had a kidney of one form, and that others, without dropsy, &c., had another form; the one was a more or less recent disease, while the other was essentially chronic, differing indeed from one another as widely as pneumonia from phthisis, hepatic suppuration from cirrhosis, acute endocarditis from chronic changes in the valves, &c. In the one case, as in the analogous acute diseases of other organs, the disease had marked symptoms, and a tolerably definite beginning, and run its course in a short period; whereas in the other, the affection being chronic, the symptoms attending it were obscure, and perhaps unappreciated, until shortly before death, although the disease had been of several years' duration. It is thought by some, however, that this chronic disease is only a further stage of the more acute variety, but of this there is no proof; and indeed, in the majority of cases, it is very evident that such has not been the case, if we judge from the fact that in the second or chronic form it is exceedingly rare to find that any symptoms have existed which usually accompany the more acute disease. Looking upon the general character of pathological processes, and this one of the kidneys in particular, I should say it was far more common for a kidney undergoing the chronic degeneration to be affected by some of the more acute changes than that the opposite should occur; for in cirrhosis of the liver, phthisis and similar long-standing diseases, the process is chronic from the commencement; and as regards phthisis, if there be found any changes in the organ which can be called acute, these are the recent ones implanted on the old.

In all forms of Bright's disease the morbid process is essentially one affecting the tubules, although in some of the more chronic changes it is still a question as to the production of new elements in the intertubular structure.

In the acuter forms of the disease this is essentially the case: inflammatory products are formed within the tubules, and thus the disease may be compared to a bronchitis; for as in the latter the inflammatory secretion is expectorated, so in the kidney it is washed out by the urine in the form of casts, unless, indeed, it should collect within them, when the secreting structure becomes in time quite blocked up: it is then that the organ becomes much enlarged by the adventitious matter within it, and is of a white color, constituting the form of disease known to Bright as the *large white kidney*,[1] in contradistinction to the contracted granular variety. The first stage of this disease exists in the malady known as acute dropsy, whether occurring from cold, or after scarlatina; in this affection the urine is for a time almost suppressed, and the little that is passed is of a reddish-brown color from presence of blood; it also contains albumen, and, if examined microscopically, renal epithelium; if the patient should die after about two weeks' illness, we should find the kidneys enlarged, swollen, soft, and of a dark color, the surface much injected, and a section exuding drops of blood. The microscope shows in such a case the tubes to have an opaque appearance, from being filled with lymph corpuscles and granular matter, &c.; some too, having lost their epithelium, are filled with a simple lymph which, if removed, forms fibrinous casts. In some cases, though this is generally at a somewhat later period, the conical portions still remaining of a dark color, the cortical structure has become pale, softer than natural, the surface not smooth when cut, and giving out a turbid fluid when squeezed; in such a case many tubes are found denuded of epithelium, and filled with masses of secretion taking on the form of the tubules. It is of great importance to know, though not yet accurately determined, what conditions of kidney are implied by certain secretions from it which are recognizable by the misroscope during life, and whether such conditions are recoverable; thus we find casts composed of lymph corpuscles, blood, and renal cells, held together by an albuminous product; sometimes the cast is composed of nothing but granules, and at other times is a transparent cylinder, as if the tubule had lost its epithelium, and the basement membrane was pouring out a pure lymph; sometimes the corpuscles are in abundance, and which cannot be called by any other name than pus. In all these a knowledge of the true state of the kidney would be much desired. All of these products you may find in the urine after death, or in the kidney itself; and thus you may make a comparison with the exudation observed during life. It is not yet positively ascertained what is the source of these various products, whether the capillary malpighian tuft throws them off into its capsule, or whether the principal changes take place in the secreting cells themselves; there are some who think the latter are especially affected in all changes in the parenchymatous organs; but for my own part, although I see these cells filled with abnormal contents and thrown off, I cannot but think, from the construction of the kidney, that most of the inflammatory products proceed from the malpighian bodies; that these are in a high state of engorgement is clear from the scanty and bloody urine, and, moreover, in the recently inflamed kidneys they can be seen as red specks by the naked eye, and under the microscope beautifully injected; also the tubules may be often found filled with blood, and containing masses of hæmatine. I met, the other day, with a case exactly resembling one which Bright figures as a chocolate-colored kidney, where the engorgement was so great that blood had passed by the urine, both in a fluid state, and as tubular casts; and after death the whole organ was found filled with blood, just as if the urinary tubules had been injected with it. Such a kidney as I first described, with these products of inflammation, is found in acute dropsy and after scarlatina, and also to a less extent as a secondary affection in various other diseases. I shall not trouble you by dilating on this last subject, but to myself it is at present the most interesting connected with renal disease; you know that in many congestive affections, as pneumonia, typhus, &c., the urine is found albuminous, and the kidney is discovered to be swollen, and its tubules full of granular matter: as the diseases causing this condition are temporary, so the kidney recovers itself; but in the case of heart disease it is different: the congestion week after week increases, the urine continues albuminous, and after death you find the kidney enlarged, and much inflammatory secretion in the tubules: the question then arises, as it did before death, —is the kidney really involved in disease, and do the anatomical changes, as well as the albuminous urine and the increase of dropsy (which appeared to be due to the renal obstruction), imply the commencement of an organic affection? I mention this, because, in any cases which you may have of cardiac dropsy where the urine is constantly albuminous, you will be anxious to know whether the kidney is affected or not, and after death the same puzzle will often remain; my own opinion is, that after such continued engorgement, it really suffers structurally as well as in function, and is attended by the usual renal symptoms.

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[1] 2036, and numerous other specimens, and various drawings, 358, 358^{16}.

If the morbid process in the kidney which usually accompanies renal dropsy continues, the secretion collects in the tubules until they become completely filled with it; and when this has gone on to its extreme degree, the organ is found much enlarged, often double it natural size, is perfectly white, and the exudation can be seen by the naked eye in the cortical part; the surface of the kidney is pale, often smooth, with the arborescent veins on the surface, and a number of opaque white specks scattered over it. The section shows the same appearance, but the deposit is in the form of lines running vertically downwards. Sometimes the surface has upon it a number of granulations; this is owing to the swelling of a congeries of tubules between the bloodvessels. The microscope shows the adventitious deposit to correspond to the exudation which has been thrown off with the urine—large masses of dark granular and fatty matter; for the inflammatory products have changed in the kidney, as they do elsewhere, into fatty granule masses, and these may be found distending the tubules. Thus, if you take a section for the microscope, you find large portions are quite opaque, and not transmitting light; these products, which at first merely filled a single tubule, now correspond to several, for the natural lining epithelium is gone, and a number are united together in one mass of disease; but whether the partition membrane is lost, is difficult to make out. In the more transparent parts, tubules will be seen quite devoid of epithelium, and filled with these black granule masses, or fat. Some, of course, will be found still containing their natural secreting cells. The conical parts do not show much to the naked eye, although sometimes there is a collection of secretion at the apices; the microscope, however, generally discovers granular matter within them also. In most cases the malpighian bodies are but slightly covered with these granule masses, only a small amount of exudation being found within. In one case which I have here, the malpighian bodies were the only parts of the structure affected, and they could be seen by the naked eye as minute white points, and by the microscope as round dark masses scattered through the field. This was quite an exceptional case, and had, no doubt, some special cause for its production.

In the *chronic form of Bright's disease* the tendency of the organs is to waste so that they may be reduced in size until they weigh, as these do, only one ounce and a half.[1] As in the form of disease already described the peculiarities are the impaction of the tubes and the enlargement of the organ, so here they are the wasting of the tubules and consequent atrophy of the whole organ. If a section be made for the microscope, the tubules will be found lying side by side, of very irregular shape, from contractions and dilatations, and sometimes not half their natural size, and at the same time devoid of epithelium; in fact the tissue has shrunken into an inactive fibrous or membranous structure; some of the tubules are found filled with granules, as also are some of the malpighian bodies, but there are none of the large fatty masses which are seen in the other form of disease, and thus the urine is pale and without any deposit. It is this form of kidney which shows so well the fibrous matrix between the tubules; much of this appearance is due, no doubt, to the shrunken state of the tissue, and it is still a question whether there be any adventitious matter present or not; but this can scarcely be decided until we know whether the kidney has naturally a matrix; it is generally so described, but Frerichs, one of the best writers on the subject, states that he finds only a little granular material between the bloodvessels and tubules; if this be so, there can be no doubt that in the form of disease of which I am speaking the fibrous tissue between the tubes is new, and, therefore, it follows that the morbid change is not one only of the tubes, but of the whole structure, and that an exudation really takes place into the intertubular tissue, which by its contraction causes a wasting of the secreting structures, and produces the granulations on the surface. I do not say, as was once thought, that Bright's disease is like cirrhosis of the liver, but I believe some forms resemble it, and the analogy of other diseases associated with it, and of a like character, rather suggests the idea of the whole tissues being involved; for I may mention that the bloodvessels are often excessively affected, not only the main renal artery but its branches, which you may perceive projecting on the cut surface, and which you often meet with in microscopic sections.

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[1] 2022^{35}, and numerous other less degrees, and various drawings 360^{30}.

The outward characters of the kidneys undergoing this degeneration are generally sufficiently well marked; the organ is smaller, and this atrophy is first of all at the expense of the cortical part, for if a section be made, it will be seen to be much narrowed, and almost touching the cones; at the same time the edge is very irregular, and the surface is granular; the distribution of the veins appears to determine the granulations, which are composed of bundles of tubes lying between them. The capsule is often separated with difficulty, and when removed the tissue is torn or adheres to it; this is another evidence that a chronic process has been going on in the kidney, somewhat similar to that of a cirrhosis of the liver. Of course there are less severe forms and many previous stages where all these exudations exist to a less extent, and sometimes the microscope is required to prove the presence of disease at all. Occasionally a kidney will be found of usual size, and yet granular on the surface, and then it has been a question whether, although the disease is essentially chronic, yet in this particular instance the morbid process may not have been more rapid, and so analogous to the large cirrhosed livers sometimes met with. I should also mention that in all the forms of chronic disease, cysts are frequently met with on the surface.

The large white kidney of which I have spoken has also been called the mottled and marbled condition; the granular state is mostly confined to the atrophied organ, although granulations are sometimes seen on the first form; these must not be confounded with the white specks of deposit. I have already said that there is no proof that this first form, which if it runs its course terminates in a large white organ, ever becomes the small degenerated one; and indeed, judging from the symptoms, we should distinguish between them; there are, however, cases now and then met with which constitute some difficulties in the matter[1]—those where patients have been ill a long time, and the kidney is found presenting the characters of both forms of disease which I have mentioned: that is, an organ of ordinary size, granular, white, and degenerating, and containing deposit visible to the naked eye; I do not, however, consider that such an appearance offers any reason for the belief that an acute is passing into a chronic disease; indeed there is no proof that all the diseased appearances are not of the same date; but should an acute and chronic affection be found

[1] 2038^{64}, &c.

together, I should look upon the latter as the more ancient, and the former as having been engrafted upon it; for, because an acute affection is present in a much diseased organ, it does not follow that that has been the nature of the affection from the beginning; for, taking the analogous case of a phthisical lung associated with pneumonia, we say that the latter has been implanted on the former, and not because of its presence that the disease has been necessarily acute; so also with the kidney.

I could prolong this subject of Bright's disease to a much greater extent, but I must have done; I will merely remark that a great many divisions of it are given by authors, but they are merely stages of the forms I have mentioned. There is the chronic degeneration which ends in extreme atrophy, and there is the more acute tubular disease which terminates in the large white organ. The latter may with propriety be again divided into two: into that condition where the organ has actually undergone a change in structure and contains deposit; and into that which is recoverable, where the organ is only swollen and coarse-looking, and associated with acute curable dropsy. These three main divisions—that where the organ is subject to an acute recoverable nephritis, that where it is large and white, and that where small and degenerated—you may all easily remember. Rayer gives six forms: his first two correspond with this first division, and he calls them acute, the kidney being at first large and red, and then growing pale. His other four he calls chronic: the first three are the ulterior stages of the same affection, or my second division; and his sixth corresponds to my third division, or the atrophied kidney. Rokitansky gives eight forms, but they appear to be the various stages of the same, beginning with the enlarged congested kidney, passing on to the white with deposit, and ending with the wasted and indurated organ. These correspond, more or less, with Johnson's acute and chronic desquamative and non-desquamative nephritis.

CYSTS.—These are very frequent in the kidney, and are of two kinds: cysts which are visible to the naked eye, and those which are only discoverable by the microscope. They seldom occur without disease of the structure, and the latter, perhaps, never; but the large cysts may arise on the surface without any great structural change. Much difference of opinion exists as to the formation of cysts, and much study has been given to them as they exist in the kidney, but with no conclusion having universal assent. Cysts may, no doubt, be formed in three ways,—by spaces forming in fibrous structures, which become filled with fluid; by dilatation of the natural ducts of the parts; or by altogether new formations or cell development. Between the two latter theories, as regards the kidney, there is much difference of opinion. It may be that both are true, seeing that large and small cysts are formed under different conditions, and, therefore, may themselves have a different origin. The microscopic cysts are only found in the atrophied kidneys, whereas the larger ones are found in all forms; in most cases these are of no importance compared with the disease which coexists.

In the *larger cysts* the contents are mostly fluid, and when analyzed are found to contain a small quantity of albumen, and the ordinary salts existing in the fluids of the body, but very rarely the urinary ingredients. Commonly small cysts are found covering the cortical parts, and these sometimes hold an ounce of fluid; more rarely the kidney is converted into a mass of cysts, as you will see in several of these specimens, some of them holding several ounces of fluid;[1] in these cases some renal structures may still be found between them, or on one side of the organ. Some of these masses of disease are, as you see, ten times the normal size of a kidney. I need not tell you that the name hydatid, which you see written on this jar, is erroneous; this is a term which was used synonymously with cystic some few years ago. These excessive forms of cystic disease constitute actual diseases, and may be felt as tumors during life, and very often their origin can be traced to some obstruction in the ureter, either from a calculus or thickening of the tube: to cases where one large cyst is formed, constituting a fluid tumor during life, the name *hydro-nephrosis* has been given. A case of this kind occurred lately, where a woman passed a large quantity of muco-purulent bloody urine, and it was found after death that it had proceeded from a cyst in the kidney. My own belief is, that these cysts are independent formations, and not produced by any change in the tubes.

Very often the cysts found on the surface of the kidney contain a thick *jelly-like matter*, sometimes like thin glue, and at others nearly solid; it resembles somewhat the colloid matter found in other parts of the body.

The *microscopic cysts* are found only in degenerated and atrophied kidneys, in the very smallest of those subject to Bright's disease,

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[1] 2046^{70}, &c.

and generally where no visible cysts are present ; they are als
with in those wasted kidneys of which I have spoken, where,
some local cause, one organ has atrophied and its fellow has
in a corresponding manner ; the atrophied remains of such a k
are often found to consist of nothing else than a mass of cyst
a piece of it be taken for the microscope, a number of round
will be seen occupying the place of the tubules : these cysts
all sizes, between a malpighian body and a secreting cell : th
formed of a membrane, and may sometimes be seen to be lin
nuclei ; they lie close together, and thus hundreds of them m
the field of vision instead of the proper tissue. I have else
given some opinions respecting them, and, therefore, I will n
add that authorities still differ as to their nature. Dr. G
Johnson strongly maintains that they are only formed b
shrunken tubes, and there is much to be said in favor of this
as they correspond mostly in size, and the one tissue replace
other; still the perfect demonstration is wanting. Some
thought them to be shrunken malpighian bodies, which cann
admitted owing to their number, and then comes the theo
their distinct growth from cells, either as new products o
secreting cells of the kidney ; Mr. Simon's idea being, tha
natural renal cells escape into the intervening tissue, and
grow into cysts. Dr. Bristowe has ventured another opini
whether they be not formed from the granule masses whic
contained in the tubes in cases of disease ; and, in reference t
step in the process, I can confirm his statement, that these m
may be often seen with a distinct wall or membrane around
The question, however, is still *sub-judice.*

FATTY KIDNEY.—When, a few years ago, the microscope wa
into use to discover the nature of Bright's disease of the ki
and fat was found in the tissue, an opinion was ventured as t
disease being a fatty degeneration of the organ. To test the
rectness of this, some diseased kidneys were submitted to che
analysis, and found to contain none, when the opposite state
was made, that Bright's disease was not a fatty change.
however, are true : the first form of disease with deposit often
tains a large quantity of fat, while a contracted organ may co
little or none. In the first case, however, the presence of
altogether a secondary process, and due to a change or degene
of the inflammatory products, and, therefore, the term fatt

applied to the essential nature of the disease, must be as erroneous as styling a cancerous tumor or a phthisical lung fatty because both contain an abundance of oil. I think, therefore, the term fatty kidney can be only used in the same way as we use the words fatty liver; not for all morbid conditions where fat is found, but simply those where this substance is present in excess; a fatty kidney being one where the renal cells will be found to contain distinct globules of oil, and met with in cases where the other organs are fatty; it is pale and soft, and it is probable that its function may be disturbed.

Lardaceous Disease of the Kidney.—Here the organ is infiltrated with the peculiar translucent wax-like matter, in the same manner as the liver and spleen; indeed, in the worst forms of the disease, all these organs are involved. The kidney is sometimes increased in size, though often it is not so;[1] it is felt to be very hard directly it is touched, and thus its nature is at once suggested; the knife makes a section with some difficulty, leaving a surface quite smooth, and having a translucent appearance like wax, and presenting no deposit visible to the naked eye; but the microscope in extreme cases shows the whole tissues involved, the malpighian bodies glistening with this material, and masses of it are seen between the tubes and also within them. Indeed, in extreme forms, the organ looks as if it had been soaked in a substance like glycerine or balsam, which had subsequently hardened and so enveloped all the tissues; in such a case as this, where the tubules have become affected, the function of the organ is interfered with, suppression of the secretion at last occurs, and the patient dies, as in chronic Bright's disease. You will find this condition of kidney placed by some with Bright's disease, but, as I believe it is a form of malady of an altogether different kind from any which Bright described, I have thought it better to separate it; and associate it with such affections as the tuberculous, cancerous, &c., which imply a morbid process due to the infiltration of some adventitious matter: this reminds me that I should state that I have often found the waxy kidney in phthisis. As cirrhosis and lardaceous disease of the liver are often associated, so may some fibrous tissue be met with in connection with this waxy matter in the kidney, especially in those cases where the lymphatic glands are also affected.

Fibrinous Deposits.—These are of the same character, and have the same origin, as those in the spleen. I have already said that they are found in cases of heart disease, especially in those where the mitral valve is affected and its curtains covered with vegetations, whence it has been thought that some matter from the latter, being taken into the circulation, is not arrested until it arrives at the minute capillaries of the parenchymatous organs; that there a coagulation occurs, and obstruction in the bloodvessels, producing a change known as capillary phlebitis. The method of production, however, is not yet clearly proved; it is certain that an obstruction occurs in these parts, and that the vessels are blocked up, and an exudation occurs from their walls, and that, owing to the impediment in the circulation, a stagnation of blood takes place around the affected part, and thus, in the kidney as in the spleen, a white mass is seen surrounded by a dark-red halo; the mass is wedge-shape, owing to the mode of distribution of the bloodvessels, the part of the organ corresponding to one large artery being affected; these masses are conical, with the base outwards and slightly protruding:[1] if examined by the microscope the tissue of the organ is still seen to be perfect, but having this fibrillated material between the tubules; after a time, as it begins to decay, it is seen to be granular, and the tubes themselves filled with granules. Here are specimens of the affection, and in this early volume of our *Reports* it is figured by Bright and Barlow. After a time the mass shrinks until it quite disappears, leaving a cicatrix; and thus, in the same kidney, you may find them in various stages—some wasting, leaving a depression on the surface; others not having altogether disappeared, and others which have left a deep cicatrix: you then see that the tissue amongst which they form becomes at last destroyed. Sometimes, though not commonly, they soften into a purulent fluid, but I have never seen a cyst produced, as some have thought.

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[1] 2036^{45}.

FIBROUS AND OSSEOUS TUMORS are rarely met with; I have seen a bony cyst in the kidney, but what its nature I cannot say.

HYDATID DISEASE OF THE KIDNEY is not very common. We often have patients before us with renal tumors in whom it is suspected, and occasionally have cases where hydatids pass in the urine; but in the post-mortem room they are not often met with;[2] in two or three instances I have found them accidentally, having produced no symptoms during life; indeed they have been found on

[1] 2031^{75}, and drawing 354^{51}.

[2] 2047^{13}.

the surface of the organ, and had not interfered at all with the structure; in one of them the kidney was expanded over the cyst, but apparently quite healthy.[1] In one case there was a hydatid in the liver, in the others the disease existed alone. In all of them echinococci were found.

TUBERCULOUS DISEASE.—This is of two kinds: one where miliary tubercle is scattered through the organ,[2] in common with other parts of the body, and is unimportant; the other, which might be rather called a *scrofulous inflammation*, constituting a primary and fatal dicease. It is sometimes styled strumous pyelitis, for the symptoms are especially a purulent urine, having its origin in the kidney, and after the continuance of this for some years, the organ becomes quite destroyed; the pelvis of the kidney is dilated, as are the infundibula, and thus large hollow spaces exist in the organ with only a trace of the secreting tissue between them; the mucous membrane is thickened, covered by a scrofulous matter, and beneath the membrane there is the same matter running into the tissue. You see by these specimens what a great destruction of the organ occurs.[3] Sometimes you meet accidentally with these diseases which have become cured; of course the organ is destroyed, but the ureter has become closed, and the purulent and scrofulous matter, being encysted, becomes converted into a putty-like mass.[4] These, I say, you will now and then meet with accidentally when opening a body, and you may regard them generally as dried-up abscesses. Sometimes these abscesses have burst externally in the loin or opened into the colon.[5]

CARCINOMA.—As in tuberculous, you may find in general carcinomatous disease, deposits scattered through the organs, but it is only after death that these are ascertained. It is only, however, where this organ is especially involved, constituting a tumor, that the disease is recognized during life, and is productive of symptoms. In these cases, however, it is remarkable how seldom the kidney can be said to be primarily affected, for although a large tumor may exist, and this after death be removed as renal cancer, yet a careful dissection discovers the disease to have been primarily in the lymphatic glands, or parts outside the kidney, and the organ itself comparatively untouched; the disease, however, puts on the form of the kidney, for it has probably penetrated the hilus, and expanded the capsule; this, I think, is the commonest form of disease, and will

[1] 2024^{84}. [2] $2035^{90}, ^{95}$. [3] 2043^{75}, and drawings 362^{50}. [4] 2065^{32}. [5] 2033.

explain the absence of foreign ingredients in the urine. Occasionally, however, the whole structure may be infiltrated and immensely enlarged, as you see here, the kidney being converted into a large white mass.[1] In the same way as biliary calculi and cancer are associated, so you may have renal calculi and cancer together, as is portrayed in this drawing.[2]

Calculi.—It is not unusual to meet with calculi in the kidney after death. In some cases both organs are found filled with them, the structure has been destroyed, and they have become moulded to the form of the pelvis and dilated infundibula; thus you see these large knotted and branching calculi fitting into the hollows of the kidney.[3] They may be formed of uric acid, phosphate and carbonate of lime, &c., and sometimes very beautiful semi-translucent white calculi of cystic oxide. Occasionally they cause abscess in the kidney.[4]

URETER.

Malformation.—One of the most common deviations from the natural condition is the presence of two ureters to one kidney, and this sometimes is associated with a double pelvis to the kidney; these two ureters may pass separately to the bladder, or unite before they enter. I have several times seen this.[5]

Dilatation.—This is a condition very frequently met with, owing to an impediment to the flow of water to the bladder. Thus in stone and various chronic diseases of the urinary passages it is found; also from direct pressure on the ureters, as from ovarian disease, cancer of the uterus, &c. The ureters are thus sometimes distended to the size of the intestine, of which numerous examples you will see on the shelves,[6] as well as dilated pelvis of the kidney, which accompanies this condition.

Contraction.—This is often associated with dilatation, and the cause of it; thus a twisting of the ureter, or stricture from previous ulceration, or presence of calculus, will all produce these conditions. Here are specimens showing calculi in various parts of the canal.[7]

Inflammation.—I have already said, that in cases of suppuration of the kidney, the disease has been propagated upwards from the bladder, and thus not only the latter organ but the ureter is found to have its mucous membrane covered with adherent flakes of lymph, and pouring out a muco-purulent secretion. In some cases the coats are infiltrated, and consequently thickened.

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[1] 2056^{55}, and various specimens of cancer.

[2] 364^{30}.

[3] 2072, &c.

[4] 2068^{32}.

[5] 2079.

[6] 2080^{25}.

[7] 2077, 2077^{54}, 2079^{56}.

TUBERCULOUS DISEASE.—This is generally associated with similar disease of the kidney and bladder, as you will see by examining the preparations of these organs. The internal surface is covered with an irregular coating of unorganizable lymph and scrofulous matter, the mucous membrane having long been destroyed, and its walls are often extremely thickened, so that on looking at these you will see the section looks like a solid stem of a tree, with a small hollow channel running through its middle.

CANCER.—In the same way, cancer is not a primary disease of the ureter, but only occurs in connection with cancer of the bladder when the adventitious products may proceed upwards in the course of this tube.

BLADDER.

MALFORMATION.—The most common is extroversion of the bladder, accompanied by a malformation of the urethra; a fissure exists in the abdominal walls, the bladder is exposed, and the ureters are seen opening directly into it, as you see in these various specimens.[1] There is a case of this kind now in Naaman's ward, under Mr. Cock; and if you place a piece of test-paper to the opening of the ureter, you will find that the urine is strongly acid as it is poured into the bladder.

HYPERTROPHY.—This is a very common result of impediment in the urinary passages, and results from stricture, enlarged prostate, &c. The walls become much thickened,[2] and on the inner surface of the organ the muscular bands are seen interlacing as strong cords.

DILATATION.—This very often accompanies hypertrophy, so that the organ becomes much enlarged in size. Not only is there a general enlargement as a consequence of the distention, but owing to the muscular coat not giving way so readily as the mucous, saccular dilatations occur; that is, the mucous membrane becomes forced outwards through the meshes of the muscular trabeculæ, and

[1] $2083^{20}, {}^{60}$.

[2] 2091^{60}.

thus numerous pouches may be formed, as you see here,[1] or sometimes one large saccular[2] dilatation, equalling the bladder in size: in the latter you may sometimes see a few muscular bands traversing its walls. Cases are recorded where great distention of bladder has been found in the fœtus, from some obstruction in the passage below.

Atrophy.—This is especially seen in long-standing cases of paralysis of the bladder, where the organ is never distended, but empties itself as soon as it receives any water from the ureter. Thus in cases of recovery from spinal paraplegia, where yet a constant dribbling of the urine is present, the bladder has permanently contracted, and become merely part of the channel between the kidney and urethra.

Injury.—The bladder is constantly being cut in the operation of *lithotomy;* when met with years afterwards, I have been unable to discover the slightest trace of the wound. It is also frequently *punctured through the rectum,*[3] to evacuate its contents, in cases of stricture; as you have several times seen. Three such cases have come before me on the post-mortem table: in one, where death occurred a few months after the operation, the opening still remained between the two organs; in the second, where death occurred a year afterwards, the fistulous opening was with some difficulty found, but had not allowed any urine through it, except for a short time after its production; in the third case a small depression or hole existed just behind the prostate, but it was blind, and the wound in the rectum was perfectly healed, so that not a trace of it could be found.

The bladder may also be wounded by the point of the catheter. If by accident, it is generally in those severe injuries accompanied by *fractured pelvis,* either from a heavy weight falling on the body, or a cart passing over it; the bodies of the pubes and ischia break, and the sharp ends pierce the bladder, as you see here.[4]

Sometimes, as I have more than once seen, the bladder has been ruptured by similar causes, without any fracture, when blood and urine are poured into the abdomen, setting up a fatal peritonitis: the bladder, when full, has also been burst by *direct violence,* as I have seen, from a kick in the abdomen; and there is reason to believe it has happened in the female during coitus. The most interesting point in reference to rupture of the bladder is, whether this can occur spontaneously from excessive distention; such cases are related, and this specimen[1] is supposed to represent a rupture from such a cause; but it shows also, what I have always met with myself, a previously diseased condition of the organ. In the few such cases which have come under my own notice, the history has been one of long-standing stricture, and subsequently of disease of the bladder; and after death a general or local peritonitis has been found connected with a sloughing condition of the latter organ, allowing the urine to escape through the coats. In these cases there was always, I say, a history of previous disease, and which was sufficiently evident by post-mortem appearances; I have never yet seen a case of spontaneous rupture of a healthy bladder.

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[1] 2086.

[2] 2087^{75}.

[3] 2412^{10}, 2412^{20}.

[4] 2104^{56}.

INFLAMMATION, OR CYSTITIS.—I have already had occasion to remark the erroneous opinion which our predecessors held, that the acute inflammations of the organs were the primary and typical diseases to which the body was liable; whereas, I am every day more convinced that the opposite is the fact,—that most of the changes in the body are chronic, and from these the acute result. The term cystitis has suggested these remarks, for, common as it is in connection with stricture, diseased prostate, calculus, and other chronic affections, it is very rare, if indeed it ever occurs, as an idiopathic acute disease.

In those cases already mentioned, where the kidneys are prone to suppurate, there cystitis will be found; thus in persons who die with calculus in the bladder or stricture, various degrees of *chronic inflammation* are constantly met with; the mucous membrane is sometimes destroyed, but more generally altered in character, thickened, covered with granular lymph,[2] which is inseparable from it, and mixed often with phosphatic secretion;[3] the urine being purulent and alkaline. The more *acute inflammation* of the bladder is generally met with in those cases where the organ has become paralysed from injury or disease of the spine, and especially if catheterism have been much adopted. In these cases the bladder becomes distended, the urine ammoniacal, the surface of the bladder inflamed; and thus, as you see here, is a case where death occurred a week after the first symptoms; the whole mucous membrane is detached, and hanging loose in the bladder.[4] It is a question much discussed, whether this inflammation and tendency to slough of the bladder (as well as the bed-sore, which so often occurs in the same class of cases) is due to the nervous influence being removed from the part, and therefore its disposition to inflame, as does the cornea when the fifth nerve is affected, or whether the inflammation be due secondarily to the paralysis, from this causing a retention of the urine and its subsequent decomposition; the latter appears to be an efficient cause in many cases.

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[1] 2090.

[2] 2089^{12}.

[3] 2091^{40}.

[4] 2291^{30}.

Pericystitis is a term which we use for inflammatory processes around the bladder, in the subperitoneal tissue; and is not uncommon as a consequence of many pelvic diseases. The most acute form is seen from infiltration of urine, beginning at the neck of the bladder, and then pervading all the structures, so that when the peritoneal coat is cut through, the cellular tissue beneath is found full of purulent matter, or even sloughing. Thus sometimes from lithotomy such infiltration has occurred, producing this condition, and ending with a general peritonitis. In cases of stricture too, where the urethra is much diseased, this occurs, and very frequently with external extravasation; it has been my lot to examine a great many cases of fatal stricture and extravasation of urine, and, besides the subcutaneous inflammation, I have very often met with a similar inflammation, suppuration, or sloughing in the cellular tissue of the pelvis, behind the deep triangular ligament. This has been due to the mischief about the stricture proceeding backwards to the neck of the bladder, and involving the prostate in the inflammatory process, whence the disease extended around the bladder.

Instances have occurred where an abscess, arising from the presence of a calculus or other cause, has caused a fistulous opening into the rectum, or in the abdominal walls above the pubes.

In this specimen you see extravasation of blood beneath the mucous membrane, by which it is raised up into a number of projections resembling the surface of a placenta.

TUBERCULAR DISEASE.—This occasionally occurs as a primary disease in scrofulous subjects, but far more frequently in connection with chronic tuberculous disease of the kidney. The latter organ is generally found much disorganized by the disease, the ureter is included, and the bladder at the same time is found thickened, and its inner surface covered by a granular tuberculous deposit, as you see in this preparation.[1]

CANCER.—This occurs as a primary disease, and may also arise from contact with other organs, as in carcinoma of the uterus.

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[1] 2035^{90}.

Occasionally we find it as a primary medullary disease, forming a large fungoid tumor in the bladder, as you see in these specimens;[1] or the surface may break up, forming a shaggy surface,[2] vascular, and generally causing death by hæmorrhage. It may be associated with the same disease elsewhere, or be quite local. In this one the bladder contained a calculus.

Villous Disease.—I have already (under Intestine) given you my opinion of the character of this affection: that the villous character of a growth is a secondary one, and may be implanted either on an innocent or cancerous tumor. The ordinary villous growths from mucous membrane are not malignant, and, therefore, the old term villous cancer is an erroneous one; but this does not preclude a cancerous growth putting on this appearance. Thus in this specimen,[3] where a thick mass is growing in the mucous membrane of the bladder, the surface is shaggy; and, on placing it under the microscope, it presents the appearance you see in this drawing, and exactly resembling the villi of the chorion. The most interesting and remarkable form of disease, however, is that where small tufts grow on the mucous membrane, and cause death by hæmorrhage. I have seen three of these cases: one of the last occurred at the Surrey Dispensary to a colleague of mine; a railway porter, young and strong, was seized with hæmaturia, and in the course of a few weeks, in spite of all treatment, died from loss of blood. All that was found in the body were two small tufts scarcely larger than peas; and from these the fatal hæmorrhage had occurred; they appeared like little tufts of moss growing from the mucous membrane; and when examined by the microscope, presented villous processes, and what is very striking, as you may see in this drawing which I made at the time, the surface is covered by columnar epithelium, long battledore-shaped nucleated cells, very different from the ordinary epithelium of the bladder. Each villus, I should have said, contained loops of bloodvessels.

Polypus.—This is a primary and fatal disease of the bladder, but not generally by hæmorrhage, as in the preceding case, but by interfering with the flow of urine, causing retention, cystitis, and consequent suppuration of the kidney. You have had an opportunity of seeing two of these cases lately, and they both occurred in children; and so also, in the specimens in our museum, which you see here,[4] and in other cases of which I have read the subjects have

[1] $2104^{14}, {}^{25}$. [2] 2104^{5}. [3] 2104^{7}. [4] $2104^{28}, {}^{30}$.

this on the recent subject, although I have seen one or tw designated in our museums.

Cancer.—The urethra may be involved secondarily in cancer growths contiguous to it; thus, I have seen a case of medull carcinoma of the bladder include the commencement of urethr it, and on more than one occasion the spongy part of the uret in superficial epithelioma.

Tubercle.—I have said that occasionally, in tuberculous dis of the kidney, the bladder is involved in the same way, and in or two cases the commencement of the urethra has been also fected. In one of these, the tuberculous ulceration of the m branous part had given rise to extravasation of urine.

DISEASES OF THE MALE GENITAL ORGANS.

TESTIS.

- **Malformation.**
- **Hypertrophy.**
- **Atrophy.**
- **Inflammation** .
  - Acute.
  - Chronic (fungus).
  - Syphilitic.
- **Tubercle.**
- **Cystosarcoma.**
- **Cancer** . . . . . .
  - Medullary.
  - Scirrhous.
- **Enchondroma.**

TUNICA VAGINALIS.

- **Inflammation** .
  - Acute.
  - Chronic . . . .
    - Hydrocele.
    - Loose bodies, &c.
- **Spermatocele.**
- **Hæmatocele.**

VAS DEFERENS AND SPERMATIC CORD.

- **Hydrocele.**
- **Varicocele.**
- **Ossified Vessels.**
- **Tubercle.**
- **Cancer.**

VESICULÆ SEMINALES.

- **Malformation.**
- **Atrophy.**
- **Inflammation and Suppuration.**
- **Tubercle.**
- **Cancer.**

PROSTATE.

Hypertrophy.
Fibrous Tumors.
Fibroid Degeneration and Atrophy.
Inflammation and Abscess.
Tubercle.
Cancer.
Calculi.

PENIS AND SCROTUM.

Malformation.
Syphilis.
Warts.
Cancer . . . . . . { Epithelioma penis.
„ scroti.
Elephantiasis.

TESTIS.

Malformation.—Under this head might be mentioned v forms of hermaphroditism, but they scarcely hold a place in lectures: the most important fact to remember in connection misplacement of the testis, is its position in the groin, where it be mistaken for morbid growths or tumors.

Atrophy.—This may occur from actual disease of the org will be presently mentioned, or simply from pressure on the affecting its nutrition: thus, after the long use of a truss, the sometimes wastes, and the same may happen from a varicocele

Hypertrophy.—The same remarks apply here as have before made—that an organ may enlarge from various adventi deposits, but does not actually increase in size from a growth normal constituents.

Inflammation, or Orchitis.—The most common form of disease is, as you know, connected with gonorrhœa, and v seems, indeed, due immediately to a continuation of the infla tory process of the urethra up the vas deferens to the testis; thus it is that the epidydimis is so frequently the first part, or solely affected. The inflammation in these cases generally subsides, and therefore you have no opportunity of examining the anatomical changes which the organ has undergone.

It is in *chronic cases*, where the organ or a part of it is sometimes removed by the surgeon, that you see the inflammatory results which take place in the tissue, and which often greatly increase its bulk; sometimes this chronic enlargement occurs spontaneously, or at least without any known cause; at other times from a blow, and at others apparently from syphilis: I believe surgeons are much at variance with respect to the last-named disease being a common cause of orchitis, but a chronic enlargement is very generally thought to have such an origin. As far as my own experience goes, I believe that the same condition which produces a node on the tibia will cause a similar exudation in other organs, and this we have already seen in the case of the larynx, liver, and probably lungs and brain; in the same way it is highly probable that the testis may be affected. As however, when such cases come before us after death, these fibrous deposits have wrought those changes in the organ which tend to an atrophy of the parenchyma, and thus the alteration in the testis found after death is rather a fibrous degeneration than an enlargement: the testicle being of usual size, or rather smaller, and when cut is extremely hard; the section is found to consist of fibrous tissue, taking the place of the seminiferous tubules, and the general appearance reminds one of a cirrhosed lung, the tunica albuginea being thickened, and sending its fibrous processes inwards. I have met with this *atrophied testis*[1] several times, and in two or three instances the subjects had been long suffering from syphilis, and this was the cause, without doubt, of the degeneration. This condition, found after death, does not necessarily imply that an inflammation with attendant symptoms existed during life, for it is rather a degeneration, and to be classed with the similar changes in other organs; whereas a syphilitic orchitis, if it exist, would no doubt be attended by enlargement.

The *chronic inflammatory enlargement* is an affection for which testes were frequently excised, and it is probable that some of these older specimens, which are deficient in history, present nothing more than this condition: one, for example,[2] is said to have been growing slowly, in consequence of a blow five years before, but I have not examined it. Sometimes these chronic inflammations end

[1] 2351^{55}.   [2] 2340.

in *suppuration*, and this is especially the case if the patient be scrofulous, or any tuberculous matter has been actually deposited in the organ; the abscess then breaks, and the glandular structure of the testis becomes exposed; this was formerly called *fungus testis*, and was generally removed by the surgeon: specimens of it you see here.[1] Now, however, these cases are cured, except where, by a long inflammatory process, much lymph has become effused into the tissue, and the organ indurated or destroyed, when an operation may be advisable. In such as these I have more than once had an opportunity of making a microscopical examination, and I have found remains of the seminiferous tubules enveloped in fibrous tissue, and their natural contents gone.

TUBERCLE.—The early conditions of this disease are best seen in the post-mortem room, for in the living subject it mostly comes before you in its later stages, or as an abscess. Thus in those dead of phthisis and general tuberculosis it is far from uncommon to find tuberculous deposit in the testis, either in the interior of the organ, or in the epidydimis. The section shows a large yellow mass, or a number of smaller tubercles scattered through it, and some of these may be softening in their centres.[2] As I have before said, it is still a question as regards many of the viscera, in which structure the inflammatory or other adventitious deposits begin; in these yellow tuberculous masses all the structures are involved; but if you examine the comparatively healthy tissue around them by means of the microscope, you will discover the tubules, as you see in this drawing, resembling those of the kidney in Bright's disease, devoid of their natural contents and epithelium, and filled with this dark granular amorphous matter; I suppose, therefore, the tuberculous disease begins by a change in the secreting part of the tubules in the same way as some think tubercles are formed in the air-cells of the lungs by an alteration in the epithelium.

I should here caution you not to call all amorphous exudation by the name of tubercle, as it is too often done, although, in all probability, the two, at a certain stage of their history, do much resemble one another.[3] You know that inflammatory lymph decays and changes to a yellow unorganizable material, and in the same way lymph, having a scrofulous character, changes to a substance not unlike it; now, this alteration in the first-named exudation is especially seen in the testis, and thus, on making a section of an organ which has been the subject of chronic inflammation, a yellow structureless mass may be found, which you might at first sight be disposed to call scrofulous, but you will probably find there is no evidence of this; and, indeed, you may notice that in cases of cancer of the testis a very similar deposit, arising from a change in lymph which has been effused, is also present, and which, in such a case, cannot be tuberculous.

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[1] 2344, 2354, and drawing 414^{50}.

[2] 2349^{50}, 2350^{10}, and drawings 414^{75}, 415^{30}.

[3] 2351^{70}, and drawing 415^{11}.

SARCOMA AND CYSTO-SARCOMA.—This subject naturally follows chronic inflammation, for, as I have had occasion to observe before, chronic inflammatory products and tumors are not always so easily separable as might be thought, for the one, indeed, sometimes constitutes the other. Thus I just now showed you these specimens of testis whose enlargement seems to be due to a fibrous element diffused through the tissue; unfortunately there is no history connected with them, and thus the difficulty of knowing whether it be better to style them enlargements from chronic inflammation, or sarcomatous tumors. Generally, however, no such difficulty exists, for if an inflammation can be distinguished from a growth by the one being an affection implicating intimately the whole tissue, and the other a growth increasing from a centre of its own, then, in many of the cases, the term fibrous tumor or sarcoma is easily applied; especially, too, if the tumor occupies the exterior of the organ, while the true glandular structure is pushed aside or stretched over it. Such a simple form of disease, however, is not so common as that which is associated with cysts and styled *cysto-sarcoma*.[1] A section of one of these presents a very striking appearance, and is that which Sir A. Cooper called hydatid. You see numerous cysts of various sizes occupying the organ and filled with a serous fluid; between them the tissue is firm, and, if examined by the microscope, is found to be composed mainly of nucleated fibre or fibroplastic cells; no trace of the original structure, as far as I have seen in the examples which I have examined, could be found; if present at all, it was pushed on one side or stretched over the tumor. As regards the nature of these cysts, opinions vary, as I have already mentioned in connection with the kidney, whether, indeed, they be distinct formations or composed of dilated ducts; the latter mode I have not been able to make out, and, judging from the very similar diseases in the female breast and ovary, I should think it unlikely.

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[1] 2352, 2353.

As in these organs so in the testis, the cysts may in some cases predominate over the solid growth, when the term *cystic disease* would be more appropriate.

CARCINOMA.—Cancer varies in different parts of the body according to the texture in which it occurs; and thus, although there is such a form as medullary with only a very tender matrix, and scirrhous with a firm and abundant one, yet the differences are due also in great measure to the character of the organ in which the disease occurs; thus, in the dense fibrous structure of the breast, cancer is scirrhous, while in the testis it is *medullary*. You see many examples of this disease on the table;[1] the organ is much enlarged; when cut, is found to consist of this soft matter, which is well styled encephaloid, for it very closely resembles the structure of the brain; on searching for remains of the testis, this is generally found on the surface, having been pushed backwards by the independent growth; and you often find, as you see here, yellow deposit of degenerating lymph as well as these yellowish-white masses of the decaying cancer itself. I have seen two cases, of which this is one, which might, perhaps, be called *scirrhous*,[2] although scarcely corresponding to this form of disease elsewhere. A part of the organ is very hard, and composed of adventitious fibrous material, while interspersed are nodules of cell growth, evidently of a malignant character. It might also be called, after Müller, *carcinoma fibrosum*. In the same way as cysts may occasionally accompany malignant diseases of the breast, ovary, &c., so may also those of the testis, and thus, instead of the intervening tissue being fibro-plastic, it is cellular, and the disease is a *cysto-carcinoma*.[3]

ENCHONDROMA.—This is a very remarkable, though not uncommon, disease of the testis; a very good specimen of it you have here.[4] You see the organ is enlarged, and composed of a number of round masses, separated by this interlacing matrix; these translucent nodules gave to the microscope the appearances you have in this drawing, of well-formed cartilage. Besides existing in its simplicity, it may be associated with the various other diseases before named, and especially cancer; I have seen two or three examples of cancer of the testis in which enchondroma also existed, and in such cases, when the disease has returned in the lumbar glands (for cancer of the testis generally is soon reproduced in the abdomen),

[1] 2361^{80}, and drawings 419^{57}, 419. [2] 2351^{76}. [3] 2352^{50}. [4] 2362.

the cartilage has still accompanied it, and, what is very remarkable, in a case which occurred to Mr. Paget, of pure enchondroma of the testis, the cartilage returned as a secondary growth in the lymphatic glands and in the lungs; I have here a small portion of the lung which is consolidated by it. Wherever cartilage is formed, you are likely to have osseous tissue, and thus you might not unreasonably expect to meet sometimes with bone in these diseased testes. In the lower animals, I believe, complete ossification of the testis sometimes takes place.

TUNICA VAGINALIS.

INFLAMMATION.—This probably is rare as an idiopathic disease, but it is constantly produced artificially by the surgeon, in order to obliterate the cavity after paracentesis for hydrocele. In such a case an inflammatory lymph is thrown out, as in other serous membranes, and the sides become adherent;[1] thus on the dead body we find the testis closely united to its sac, or in some cases, where obliteration is not perfect, merely cords of lymph passing across, as you see in these specimens.

HYDROCELE, or collection of serum in tunica vaginalis, might be called a chronic inflammation of that membrane; it resembles in character a chronic pleuritic effusion, and when tapped we find the fluid coagulates.[2] When the opening of the sac communicates with the abdomen the term congenital hydrocele is given.

Among the results of chronic inflammations we find the serous membrane very much *thickened;*[3] in these cases it is a question whether there may not have been a previous hydrocele, and curative measures adopted, for I do not think the serous cavity is always obliterated by injection. Sometimes there are merely indurated spots on, or hard *nodular bodies* projecting from, the surface; these occasionally become *cretaceous*, and, indeed, the whole membrane may become bony or calcified.[4] These depending bodies may sometimes drop off, as occurs in the joints, and may be found loos the tunica vaginalis.[1] In one or two such which I have exami the texture was not true bone.

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[1] 2378^{50}, filled with lymph; 2381, obliterated. Since this lecture was given, a patient of Mr. Birkett, who had been treated for double hydrocele, died of another disease, a few days after the last one was injected. The first one showed total obliteration of the cavity, and the other presented a most beautiful specimen of serous inflammation, such as is met with in other parts; the cavity was filled with a yellow lymph, and surface of testis covered by a firmer layer.

[2] 2370^{50}, 2375.

[3] 2381^{25}.

[4] 2383.

Spermatocele.—This is the same as encysted hydrocele, and formerly called varicocele.[2] If you examine many testes after de you will often find little vascular dilatations near the epididy sometimes several hanging by little stalks;[3] these appear to be remains of some parts of the Wolffian body during the proces development. Occasionally, however, they grow to a consider size, sometimes even as large as the testicle itself, when they c before the notice of the surgeon who taps them. I have sev times had the fluid removed from them handed to me for exami tion; it is limpid, but not quite so transparent as pure serum, be faintly opaline, as you might imagine water to be with the addi of a drop or two of semen; it is neutral to test paper, contains solids on evaporation, but on microscopic examination it is fo to contain numerous spermatozoa; it is thus tolerably certain these cysts communicate with the seminiferous tubes.

Hæmatocele.—This is where the tunica vaginalis becomes fi with blood, arising generally from injury. The blood usually comes absorbed, and no injurious result follows; sometimes fluid parts are taken up, and the solid form distinct layers, as see here, resembling the interior of an aneurism;[4] in the m unfavorable cases the blood softens down, and a sanguineous cys formed: in such a case, if the cavity be tapped, a fluid is drawn corresponding to changed blood in other parts—viz., chocol colored fluid, containing numerous plates of cholesterine and hæ toidin crystals, as I have before described.

VAS DEFERENS AND SPERMATIC COR

Hydrocele of the cord sometimes occurs as a distinct form disease, as you see in this specimen;[5] also the other changes occur in the serous membrane as I have already mentioned, a this earthy degeneration.

Varicocele is a term generally confined to a varicose condi of the spermatic veins, which thus form a large tortuous mass the lower part of the testis. Sometimes the vessels become ossif and I have seen them forming a hard mass, and associated with a similar cretification of the iliac and pelvic veins. The vas deferens may also sometimes be found ossified.[1]

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[1] 2381^{50}. [2] 2377. [3] 2385^{50}. [4] 2384. [5] 2369

Tubercle may affect the cord, when the same form of disease exists at the base of the bladder.

Cancer, in the same manner, may involve the cord,[2] and in this specimen you see a melanotic tumor.[3]

VESICULÆ SEMINALES.

Malformation.—In cases where there is only one kidney and ureter, the prostate is sometimes small and ill formed, and the vesicula seminalis on that side wanting.

Atrophy of these organs occurs often in old age, and a species of degeneration is probably seen in enlargement of the cells, which often occurs.

Inflammation and suppuration is not unfrequently met with in cases of pericystitis and abscess of the prostate, where the base of the bladder is involved.

Tubercle.—In cases of general tuberculosis, these organs may be affected, as you see in these specimens; in this one, which we met with the other day, only one is involved, but this is much increased in size.[4]

Carcinoma also, when affecting the neighbouring organs, may involve also the seminal vesicles.

Concretions, as you see here,[5] may also be met with.

PROSTATE.

Hypertrophy.—This is the most common and important disease of this body, especially when the middle portion of the organ is affected, constituting what is called the third lobe. It was formerly, as you know, believed to be a gland, but now it has been shown, by Ellis and others, to consist of a mass of fibrous and muscular texture continuous with the similar tissues of the bladder, and only glandular on its surface, which is covered with mucous crypts; moreover, the prostate, or that part known as the sinus pocularis,

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[1] 2367^{44}.
[2] 2366^{25}.
[3] 2367^{80}.
[4] 2367^{90}, ^{98}.
[5] 2367^{95}.

is homologous to the uterus, and the morbid changes occurrin
it are like those of the female organ. Thus the commonest di
of the latter, the fibrous tumors, are composed of the same text
fibrous and muscular, as the uterus itself, and in the same wa
tumors and growths in the prostate are but an increase of the na
tissue which composes it. These may not only be *distinct tu*
but actual *enlargements;* the former are seen to be round bo
often about the size of a marble, and when incised may be sque
out of the organ, for the fibres composing them are circular
distinct. Sometimes the so-called third lobe is found on secti
consist of one of these isolated tumors. The prostate may be
uniformly enlarged,[1] as you see here, where the whole organ
large as an orange from hypertrophy of the lobes, and at the
time the middle portion is enlarged into a distinct piece which
jects into the bladder.[2] Often this centre portion constitutes
great bulk of the new growth, and gives rise to important sy
toms, as you may see by this and other examples, showing its
tunnelled by catheters. Although such enlargements prob
occur more frequently in advanced years than in the middle p
of life, yet they by no means are necessarily connected with
for many years past I have been in the habit of examining
prostate of old persons, and have never found it enlarged, exce
those exceptional cases where it has produced symptoms, and
treated during life; I can, therefore, quite confirm the stateme
Mr. Henry Thompson, that enlargement of this organ is n
necessary attendant on old age; indeed, I have found it somet
rather atrophied: do not mistake my meaning, which is not
enlargement is not more frequent in advancing age, but is not
of its necessary or ordinary concomitants, as grey hair or calc
bloodvessels, as was formerly thought.

FIBROID DEGENERATION.—So far from enlargement necess
occurring in old age, I have sometimes found the organ atrop
Also in younger people I have met once or twice with a cond
which might be called fibroid degeneration; and in one case
was associated with a similar affection of the testis, and whi
have no doubt, was due to syphilitic cachexia. The organ was
verted into an amorphous hard substance, interspersed with op
white parts indicating a fatty and granular degeneration.

INFLAMMATION AND ABSCESS—a not uncommon affection to c

[1] 2389^{75}.

[2] 2389, 2389^{35}.

before the surgeon, and not unfrequently met with on the post-mortem table in connection with stricture. In those long-standing cases of this affection where, perhaps, urinary fistulæ have long existed, and especially where false passages are present, and the patient has died from some acute mischief about the part, either with or without external extravasation of urine, the prostate and coats of the bladder are often found involved in a suppurative process. It is difficult to say when such mischief has occurred, what has immediately set it up—whether a mere continuance of the urethritis backwards, or injury done to the prostate by catheters, but we find openings on either side passing into this organ; and when the lobes are opened, they are found full of pus, and the whole structure in a sloughy condition. I am under the impression that practitioners are scarcely aware how, in their very bad or fatal cases of stricture, the mischief is often deep seated, and that prostate, bladder, and pelvic cellular tissue, are frequently associated with the more superficial disease in urethra and external extravasation.

You sometimes find the prostate *hollowed* out or sacculated on each side, as you see in this specimen,[1] and resulting, apparently, from pressure of urine due to stricture; I do not think in these instances it was the effect of abscess.

I may here show you this specimen[2] of prostate, which I removed the other day from a man who had been operated on for lithotomy fourteen years before, and in which you see not the slightest trace of the incision.

TUBERCLE—As in the adjacent organs, this is not probably a primary disease, but merely a part of a general tuberculosis, as was the case in this prostate,[3] which you see is full of tuberculous matter.

CANCER.—The same generally holds good of cancer, but not so strictly, for it does sometimes occur as a primary disease. A case occurred, if I remember rightly, last year, to Mr. Cock, of this affection.

CONCRETIONS OR CALCULI.—These may be found, on making a section of the prostate, as small yellow translucent bodies like amber, or sometimes blackish grains.[4] Sometimes, however, large calculi[5] form in the organ, as you see here, where also they are endeavouring to escape into the urethra.

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[1] 2398. [2] 2104^{50}. [3] 2393^{75}. [4] 2394. [5] 2395, 2397^{5}.

PENIS AND SCROTUM.

I include under this heading merely the diseases of the skin, as the part of the genital organs not yet treated of. Syphilis I shall pass by as a purely surgical question, merely suggesting to you, that you should become familiar with the results of the disease, as it is often important to discover on the dead body any traces of former sores; thus you may have to look for cicatrices on various parts of the penis, and for bubo in the groin.

Warts on Penis.—These spring up generally in consequence of irritating fluids, and thus are so often found in connection with venereal complaints.[1] They probably often arise, and may do so spontaneously, in the sebaceous follicles, in the same way as I mentioned when speaking of the skin; one of these glands enlarges and bursts, and from the bottom there springs up a warty growth: for the same reason, as I before mentioned, that sebaceous tumors may be confounded with cancer of the skin, so, with equal probability, these warty growths may be called cancerous, and I have no doubt the penis has sometimes been amputated for a purely innocent disease.

Cancer of Penis.—This is generally, as elsewhere on the skin, of the epithelial variety, and is called epithelioma;[2] it generally assumes a warty character, and thus very large cauliflower excrescences are produced on the organ. This term is peculiarly applicable to a fine specimen such as this; and in this other one you see the disease at its earlier stage, where merely the adjacent parts of the glans and prepuce are affected. I do not know that surgeons have yet agreed as to its greater frequency in those who have been the subjects of congenital phymosis, but I can well believe how any unnatural condition should excite the disease, and especially where any irritating secretions are retained. The disease, like epithelioma elsewhere, is a local affection, and when removed early, does not return. If it be allowed to continue, the disease involves a large part of the skin, and I have seen that of scrotum and perineum also affected; at the same time, the glands in the groin become enlarged by the peculiar epithelial curdy deposit, and these softening, cause a constant discharge, which wears out the patient by exhaustion or hæmorrhage. If, by chance, the amputation does not take place at a sufficiently early period, the glands become involved, and the patient dies in the manner I state. On examining the body, you may find that the more superficial have contaminated some of the deeper glands, and a few around the iliac vessels may be involved; but, apart from this, no disease will be found in the body.

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[1] 2428^{10}.

[2] 2427^{70}.

Cancer, or epithelioma of scrotum, formerly called chimney-sweepers' cancer, is the same kind of disease as that just mentioned, but affecting the skin of the scrotum; it is caused especially by the irritation of soot, and is now, I believe, much less frequent than formerly; a round raised raw surface is seen on the scrotum, having an ichorous discharge;[1] when excised early, a perfect cure results; when not, the inguinal glands become affected, as I have just mentioned, and death in the same manner. You remember how different the result of carcinoma of the testis, which, being of the pure medullary kind, very soon involves the lumbar glands, and the patient dies with large tumors in his abdomen and other organs. In all these epithelial growths you may meet with the peculiar microscopic structures I before mentioned, the large capsules and imperfectly formed epithelium.

CHRONIC HYPERTROPHY OF THE SKIN AND CELLULAR TISSUE, OR ELEPHANTIASIS SCROTI.—This is the same kind of affection which occurs in the leg, under the designation elephas, or elephantiasis arabum; and the genital organs of both male and female may be affected. It often occurs in this country to a slight extent, but you may see by our Chinese pictures, to what immense size these tumors grow in the East; this is partly due to the want of surgical skill to remove them when small. One of the most remarkable is that placed in the model-room, and was removed by Mr. Key, from Hoo Loo, a Chinaman, and which weighs several pounds.

I have already showed you a scrotum containing *chalky deposit,* in a gouty subject.

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[1] 2386^{50}.

DISEASES OF THE FEMALE GENITAL ORGANS.

LABIA AND EXTERNAL PARTS.

- Inflammation.
- Syphilis.
- Warts and Condylomata.
- Epithelioma.
- Fibrous Tumors.
- Encysted Tumors.
- Sanguineous Tumors.

VAGINA.

- Malformation.
- Occlusion.
- Inflammation .
  - Leucorrhœal.
  - Aphthous.
  - Ulcerative.
  - Gangrenous.
- Warts.
- Polypi.
- Cancer.
- Cysts.

UTERUS.

- Malformation.
- Malposition.
- Congestion.
- Inflammation .
  - Ulceration.
  - Occlusion of os.
- Fibrous Tumors.
- Polypus ..... Various forms.
- Recurrent Fibroid.
- Cancer . . . . . .
  - Scirrhous.
  - Medullary.
  - Epithelial
  - Cauliflower.
- Tubercle.

AFTER PARTURITION.

- **Metritis** . . . .
  - Mucous membrane.
  - Substance.
  - Peritoneal surface.
- **Rupture.**
- **Fatty Degeneration.**

FALLOPIAN TUBES.

Inflammation and Results.
Tubercle.
Cancer.
Cysts.

OVARIES.

Atrophy.
Extravasation of Blood. Corpus Luteum.
Inflammation and Abscess.

- **Adventitious Growths** . .
  - Simple cysts.
  - Multilocular cysts.
  - Fibroid tumor .
    - fibro-plastic.
    - simple fibrous.
  - Cysto-sarcoma.
  - Alveolar disease.
  - Carcinoma.
  - Cysto-carcinoma.
  - Piliferous cysts, with hair, teeth, &c.

MAMMA.

Hypertrophy.
Atrophy.
Inflammation and Abscess.
Dilatation of Ducts.

- **Adventitious Growths** . . .
  - Adenocele, cysts, sarcoma, &c.
  - Recurrent fibroid.
  - Carcinoma . .
    - Scirrhous.
    - Medullary.
    - Colloid.
  - Hydatid.

UTERO-GESTATION.

OVUM.

DISEASES	Chorion; vesicular disease. Abortion. Amnion.

EXTRA-UTERINE PREGNANCY.

PLACENTA.

POSITION.

HÆMORRHAGE . DEGENERATION .	Miscarriage.

INFLAMMATION.

UMBILICAL CORD.

DISEASES AND MALPOSITIONS.

FŒTUS.

DISEASES LEADING TO MALFORMATIONS.
MONSTROSITIES.

LABIA AND EXTERNAL PARTS.

INFLAMMATION.—All simple inflammatory, as well as syphilitic and gonorrhœal affections, will be brought before your notice by the surgeon.

WARTS and CONDYLOMATA are constantly met with on these parts. The former[1] may be of the small kind, like those which occur on the hands, though they often form large masses; as do also the latter.[2] When these fibrous masses assume a large size, they correspond to the elephantiasis scroti of the male, consisting indeed of similar hypertrophied skin and cellular tissue. Here you see a large tumor from the labia,[3] and another from the clitoris.[4]

EPITHELIOMA, or epithelial cancer, sometimes attacks the external genitals, as represented in this drawing; but it is not a very common affection.

[1] 2286. [2] 2289^{80}. [3] 2288^{28}. [4] 2285.

Fibrous tumors may occur in the labium as well as other parts, whence they are removed by the surgeon, as you have constantly seen. They are composed of dense cellular tissue like the labium itself.

Encysted tumors may also be sometimes met with in the same part; I have seen two or three such, and they contained a limpid watery fluid.

Sanguineous tumor, or thrombus, arises generally during a severe labor, owing to pressure of the child's head, by which a large vessel, generally a vein, is lacerated: blood is rapidly poured out, and a large tumor is formed; if opened, coagulated blood is discharged. You may see similar swellings in the surgical wards, arising from direct blows, and they occasionally appear to have arisen from strains.

Hernia.—I may just allude to tumors in the labium, produced by inguinal hernia.

VAGINA.

Malformation.—There are the various forms of hermaphroditism, which may alter its character. It may be *deficient* altogether when the uterus is absent, or end in a *cul de sac;* or it may be *double,* as in this case of double uterus. In cases of imperforate anus, the rectum sometimes opens into the vagina.

Occlusion.—This sometimes occurs, as you see in this specimen, where, in consequence of its closure, the secretions collected above, and dilated the cervix of the uterus. The stricture was incised by Mr. Key, and the fluid evacuated; the full history of which you will find in the second volume of our *Reports.*[1]

Sometimes the vagina is closed by *imperforate hymen,* when an operation has to be performed, as you saw the other day, in a patient of Dr. Oldham, where more than fifty ounces of dark pitchy fluid, and of the consistence of treacle, were drawn of; it appeared to consist of altered blood mixed with mucus.

Inflammation.—Gonorrhœal and syphilitic diseases I need not mention; nor *leucorrhœa,* except to remind you of the propriety of examining these discharges by the microscope, for sometimes the knowledge of their appearance may be of great service. The white discharge from the vagina contains merely mucous corpuscles and pavement epithelium, while that from the os is more gelatinous, and, if it has escaped from the cervix, may contain cylinder epithelium. Hassel, quoting from Donné, figures a parasite from the vaginal mucus which he calls *tricho-monas,* resembling a mucous corpuscle with cilia attached to it. I have never seen it. *Aphthous inflammation* sometimes occurs in vagina and vulva, as in the mouth, and it forms a very troublesome affection in women. The mucous membrane is inflamed, red, and covered with small ulcers. Also there is another idopathic form of *vaginitis* which corresponds to the other varieties of stomatitis; thus, in the children out-patients, an inflammation accompanied by a discharge is very frequently seen, and which is often very difficult to distinguish from gonorrhœa. As in the mouth, a rapid *gangrene* or *sloughing* ensues, so sometimes the same occurs in the external genital organ of children, and the same name, *noma,* has been given to it; it has often occurred as an endemic in particular localities, when its nature cannot be mistaken; but, if meeting with an isolated case, you might for a moment believe it to have been the result of violence. You must be quite prepared for any such suggestion, and remember, that amongst the poor, where there is often a common sleeping-room for many individuals, a charge of violence is very apt to be made; but in these cases of idopathic inflammation, it is rather the vulva and external parts than the vagina which is affected. A case which occurred here about two years ago might have given considerable difficulty in diagnosis, had there been any suspicion of violence; for not only were the labia and adjacent parts mortified, but owing to the purpuric condition of the body, which had given rise to the disease, large livid marks, exactly resembling bruises, existed on the arms and legs. Like cancrum oris, it is generally a consequence of measles, or one of the exanthemata. Gangrene may of course arise from direct injury or during labor.

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[1] 2281^{50}.

WARTS OR WARTY GROWTHS are sometimes met with in the vagina, as you will observe in our wax models.

POLYPI grow sometimes from the walls of the vagina. In a case we not long ago examined, where a uterine polypus existed, another was found growing from the vagina; and in another case, a polypus which had been removed by ligature, sprung altogether from the vagina; it was soft and vascular as the ordinary uterine polypi. These are not very common.

CANCER is rare as a primary disease; but in cases of cancer of the uterus, the upper part of the canal is generally involved. In the rarer form of disease, *epithelioma* of the external parts, the lower end may be involved.

Cysts, like this one,[1] are sometimes removed from the vaginal walls.

UTERUS.

Malformation.—This organ may be altogether *absent*, as I have now seen on two or three occasions. On dissection, the merest trace of the fundus, as a slight ridge, may be seen on the posterior surface of the bladder. If the ovaries are present, the characters of the sex are still present; or the uterus may be double, as you see in this specimen,[2] where also there are two perfect vaginæ; in these[3] you see a disposition to duplicity, in the uterus being bicornuate, or the fundus separating into two distinct cavities.

It may acquire an abnormal form from various tumors, &c., compressing it, but especially is it seen altered in cases of ovarian disease, where adhesion takes place and the organ is forcibly drawn upwards; by this means the cervix becomes immensely lengthened.[4]

Malposition is acquired from disease; besides the procidentia and eversion met with during life, you sometimes find on the dead body the uterus bent on itself at the os internum, or junction of cervix with body; it may either bend forwards and, forming a right angle, press on the bladder, or, being bent backwards, press on the rectum:[5] the one is called anteversion or anteflexion, and the other retroflexion; the latter being the most common.

I might here just remind you, that you may sometimes wish to know, when you open a body, whether the uterus has ever been impregnated, or borne children, or whether it be a *virgin uterus*, as the organ is called which has never held an ovum. The former is somewhat larger than the latter, and the os bears traces of having been dilated, or even lacerated, and thus the irregular puckered mouth compared with the smooth oval opening of the latter; the cervix is not so long as in the virgin organ, and the rugæ are in great measure obliterated; and the cavity has a rounded form instead of a triangular shape.

Congestion.—In all diseases where the blood is disposed to stagnate—whether from mechanical cause, as in morbus cordis, or from the morbid state of the blood itself, as in fever—you may often find the uterus and ovaries, like other organs, highly congested; and thus, just as there may be a flow of blood from the intestine or other surface, so also there may be from the uterus. You may thus find in fever and other diseases, the interior of uterus containing blood, and the question of menstruation will be suggested to your mind, as it constantly is to the nurses during life, although nothing but a morbid congestion exists.

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[1] 2281^{50}. [2] 2261^{85}. [3] 2261^{78}, &c. [4] 2259^{90}. [5] 2259^{95}.

INFLAMMATION.—Acute metritis, as an idiopathic disease, is rare; it is generally connected with parturition, as I shall presently mention. As a chronic disease it is believed to be the cause of some forms of dysmenorrhœa, particularly those where at every menstruation a discharge of membrane takes place, as you see in these bottles.[1] It is still a question whether these be inflammatory exudations, or a mere alteration of the mucous membrane, as occurs in the formation of the decidua. They consist mostly of layers of pavement epithelium, and this has given rise to the conjecture that they are formed merely in the cervix. This piece of membrane which I hold in my hand, was sent me for examination by a practitioner in the neighbourhood, and when placed under the microscope is found to consist of the most beautiful layers of flattened epithelium, and reminds one of the diphtheritic casts from the throat which are now so constantly being seen. On account of this character, I thought it must have come from the upper part of the vagina, and I have no doubt a part of it did; but on one portion the rugæ of the cervix are accurately modelled.[2] The fact of the small size, however, of this cast, and the meeting of its inner surfaces, is no objection to its being from the vagina, for you must remember that the walls of this tube fall together during life, and that it does not stand open as you see it represented in anatomical diagrams. I may just remind you, that the epithelium lining the uterus is of the columnar variety until just within the cervix, when the scaly form commences, and proceeds over the os to the vagina.

[1] 2259^{95}.

[2] I do not know, however, that this affords any objection to the membrane having come from the uterus, or why a surface with a cylindrical epithelium shonld not throw out a mass of cells which, conglomerated together, form a tesselated structure; in fact, I believe the decidua does contain cells like those I have described in this membrane.

The inflammatory diseases of the *os uteri* are separate affections, and constitute, according to some obstetricians, a very large part of female disorders connected with vaginal discharges and various uterine disturbances; the lips of the uterus in these cases being said to be frequently ulcerated. They are not fatal disorders, and this is the reason, I suppose, why they are not more constantly met with after death, it being quite the exception to find ulcers in the uterus removed from the dead body; we do, however, meet with less degrees of disease where the *os* is congested or granular, and the epithelium even abraded; conditions which, owing to the turgidity and vascularity existing during life, may present a much more striking appearance than when seen after death.

The *os uteri* undergoes various changes from labor; it is seen to be puckered or fissured, or even absolutely closed, so that, as a preparation before me shows, the lips of the organ came quite away at a subsequent confinement. It also becomes narrowed by a chronici nflammatory induration of the lips or cervix, and thus one cause of painful menstruation, as you see in this specimen.[1] A closure of the *os uteri* may lead to a dilatation of the body of the uterus, as you may observe in one of our preparations.

Fibrous Tumors and Polypus.—I have already said, when speaking of the prostate, that new growths within it are of the same structure as that of the organ itself; and that this fact was analogous to what occurs in the uterus. This organ, as you know, consists of muscular fibre, but which in an unimpregnated state is scarcely distinguishable by an unpractised eye from simple fibrous tissue, and the tumors which grow within it are composed of the same elements; it is, however, when the organ is rapidly growing in size during pregnancy, that new well-formed muscular fibres become developed, and then it is that a tumor, if one be present, also increases, and its muscular nature becomes apparent; consequently the name muscular tumor has been substituted for fibrous. The fibres are large, translucent, and solid, and appear flat like so many blades of grass. These uterine fibrous tumors, or scirrhous, as they were once called, are exceedingly common, and we are almost daily meeting with them in persons of advancing life. They commence within the walls of the uterus, generally the fundus, and thus when a section is made they are found imbedded in the tissue, forming round circumscribed masses. They are equally dense with, or more so than, the uterine structure, and the course of the fibres is more manifest; these running in a circular direction, and encompassing a centre from which the disease appears to have sprung. In a large tumor, a number of these concentric masses exist, and the fibres are seen coursing and curling in all directions, but more or less disposed to include certain definite spaces within them: sometimes several small tumors are seen when the uterus is cut through. As they grow they project from the surface, and then slowly enlarge within the cavity of the abdomen; they exist for years, and there is scarcely a limit to the size they may reach, although rarely exceeding the size of the head, as you may see by examining our numerous specimens. Very often a bunch of them grows from the surface, as you may see here, forming a mass of distinct tumors.[1] Occasionally they become pedunculated,[2] when they may be seen hanging by a slender cord to the fundus, and I believe they have even been found loose in the abdomen. The firmness of these tumors, or the hardness when cut with the knife, is sufficient to characterize them, and especially if there be any gritty or earthy matter within them, which never occurs in softer or cancerous growths. Occasionally they wholly ossify or, rather, calcify, when they become converted into round masses of bone; and if this change occur in a tumor which has grown inwards (of which I shall presently speak), the uterus may be found filled with what is apparently a large calculus: a specimen of this you may see here.[3] I have examined portions of this, and find the structure amorphous, having none of the characters of true bone; for this reason the mistake cannot now occur, which did some years ago, in supposing such a bony mass, which was found in a churchyard, to be an exostosis.

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[1] 2259^{70}.

Polypus is the term used for the tumors which grow within the cavity of the womb, and these are mostly of two kinds: the one resembling the tumor already mentioned, and which, commencing within the uterine walls instead of growing outwards, projects inwards, and is named the *fibrous-tumor polypus*, or, as it would now be called, muscular; while the other, which is the more common variety, grows from the mucous membrane or tissue below it, and constitutes the *ordinary fibrous polypus*.

The first form resembles in structure the tumor already spoken of, consisting of the same tissue as the uterus itself, and the fibres arranged in the curvilinear way spoken of; moreover, the tumor is

[1] 2270.

[2] 2278^{30}.

[3] 2280^{32}.

hard, though not so much so as when it grows from the outside of the organ; it sometimes softens in the middle, and thus small cysts may be found within: the external tumor contains but few vessels, whereas this contains more, but the hæmorrhage which occurs during life is mostly from its mucous surface. This fibrous-tumor polypus, from commencing within the walls, is thoroughly incorporated with them, and, growing from the fundus and sides,[1] it expands the uterus, which becomes stretched over it until it sometimes reaches the size of the head; the tumor may now begin to slough on the side towards the os, and a part tend to escape,[2] but operative measures being generally unattended with success, and in most cases quite impossible, death occurs from repeated hæmorrhage; or its spontaneous attempts to escape, may evert the uterus;[3] we find after death the uterus distended to a globular form surrounding the tumor, which is attached to it and intimately blended with it by perhaps half its surface.

The more ordinary form of polypus, fortunately, is that which grows by a peduncle from the internal surface of the womb, and is that which you so often see removed by the obstetric physicians, and which we are so constantly meeting with in the incipient stage in the post-mortem room. You see them growing from the internal surface of the uterus by a peduncle, and their most favorite seat is the body of the organ just above the os internum,[4] though you may also find them attached to the fundus. As soon as they attain any size they pass into the cervix and protrude from the external os. In this one, which we met with the other day, you see a polypus protruding from the uterus and hanging by a slender peduncle from its very top.[5] Sometimes, instead of so soon endeavouring to escape, they dilate the uterus and grow much larger, or, if they be not removed, this increase in size may go on in the vagina long after they are extruded. The tissue of these tumors is fibrous, but the elements are much looser than in the first variety, forming sometimes almost a spongy texture, and at the same time they are highly vascular, for if they be injected through the uterine vessels, large arteries may be seen coursing throughout them. You will find the surface covered with columnar epithelium, as you see represented in this drawing. I will not trouble you with the various names which have been given to these tumors, according to their firmness or vascularity; but I may show you these specimens of *cystic polypus*, where you see a small polypus having a number of transparent cysts or vesicles, on its surface; from the fact of these being sometimes found in the cervix, it has been thought that they might have been formed from Naboth's glands, which, when very large, as existing in a pregnant uterus, present somewhat this appearance; but the fact of the same uterus[1] containing a similar one within the cavity of the body, precludes such an idea; and in this other specimen[2] a similar tumor, though small, is seen near the fundus. They are either distinct formations, as in cysto-sarcoma of other organs, or they originate in the glandular structures, as Dr. Oldham thinks.

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[1] 2267, 2275^{91}. [2] Drawing 387^{94}. [3] 2261^{47}. [4] 2261^{50}. [5] $2261^{39,40}$.

Recurrent Fibroid Disease.—As surgeons now for many years have recognized a class of growths intermediate in character between innocent and malignant, both in their structure and history, to which the name recurrent or semi-malignant has been given, so it is certain that the internal organs may be similarly affected, and I have now seen several examples of this disease as it affects the uterus, and this is one of them.[3] The texture is composed of nucleated fibre, and is thus not so firm as that of simply fibrous tumors; it is softer and of a whiter color; it does not, however, emit any milky juice like cancer, and in its mode of growth takes a place midway between a simple polypus and true malignant disease; thus it does not grow from a single stalk like the former, nor does it destroy the tissue of the organ like the latter, but, as you see here, springs from nearly the whole surface of the uterus, and which in its attempts to spontaneous removal has completely everted the organ; the edges of the growth are sloughing. It would have been quite impracticable in a case like this to have removed the growth, and in cases where this has been done, it has returned, and in one instance, after the existence of the disease for some years, it proved fatal by secondary deposits in the lungs.

Cancer of the Uterus.—This is usually divided, as cancer is elsewhere, into scirrhous, medullary, epithelial, cauliflower, &c., and, although varieties do indeed exist, the character of the disease which attacks this organ is remarkably uniform; in the great majority of cases the malady being the same. The disease begins in the cervix, causing an induration of its lower part and the os, and after a certain amount of infiltration a softening takes place, and an open cancerous sore results; this gradually extends upwards and down-

[1] 2260^{12}. [2] 2261^{10}. [3] 2262.

wards, eating away the tissue of the body of the organ as well as the upper part of the vagina; in bad cases the disease penetrates to the rectum behind, or to the bladder in front, as you will see by many of our specimens.[1] The patient dies at this time, or even before, from exhaustion, and on post-mortem examination we find, as a rule, no other disease except that mentioned, the cancer having been altogether local. What, then, is its nature or degree of malignancy; is it like the more virulent form, medullary, or the local and epithelial? This can scarcely be answered until the whole subject of cancer is more understood; the general opinion has been, I believe, rather towards its resemblance to epithelioma, on account of its local nature, and from death resulting as a rule, without any other structures being involved than those in contact with the disease. On the other hand, there is much reason to place it with medullary cancer, and to this view my own opinion inclines, both because occasionally secondary deposits may be found in the lumbar glands, kidneys, liver, &c., and especially because the adventitious structure is composed merely of simple cells, and not of those laminated capsules which are peculiar to epithelioma. I might also say that the character of cancer cannot be simply told by the fact of its limitation to one spot, or its existence in many parts of the body at the same time, for I am strongly under the impression that this result has much to do with any interference with the original disease; in the analogous case of the breast, I have frequently noticed, that where no operative measures have been used, and a sloughing and extensive local disease ensued, death has occurred without any implication of other organs; and so indeed, in other cases of cancer where death has occurred soon, very often no internal propagation has taken place. The ordinary form of cancer of the uterus, then, is, as I have described, generally local, but at the same time I believe allied in character to ordinary medullary cancer.

Scirrhous, I believe, is the term used when an infiltration of the cervix has gone on slowly, producing great induration; it is not a different form of disease from what I have described, but merely its first stage prolonged to an excessive degree; at least I have never met with any disease after death especially deserving of the name.

Epithelial Cancer.—This may sometimes occur around the os uteri, in which case the peculiar cells would be found, though subsequently would not be met with when any ulceration has occurred. It is not very common.

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[1] 2264^{40}.

Cauliflower Excrescence.—This is not common, but you will often hear it spoken of as a peculiar form of disease of the uterus; it resembles, I believe, the papillary or warty growths on the penis, which I have described, both in their general appearance and minute anatomy, It throws off a watery discharge from its surface, and is found on examination to consist of papillæ containing minute ramifications of arteries: I have already said that a warty surface may belong to an innocent or malignant growth, and as regards the present case, although I have had no opportunity of making a thorough examination of this rare disease, we are told by physicians accoucheur, that it has a basis of epithelial cancer, and that it returns after removal.

I have said that ordinary cancer of the uterus begins in the cervix, and kills the patient before the fundus of the organ is affected. I should mention, however, that cases are recorded where the disease has begun in the fundus; but even here I am not sure the organ was not secondarily affected, for such has been the case in all the instances of the kind I have seen. Thus you remember a woman we examined a few weeks ago, who, after the removal of a tumor from the abdominal walls, died from a return of the disease within the body; and there we found the lumbar glands, ovaries, and body of uterus, involved in one cancerous mass; in this case, if we had not known the history, and seen the scar of the operation on the abdomen, it would probably have been thought that the uterus had been first affected; but the history of the case showed rather that the lumbar glands were the first internal parts involved.

Tubercle.—It is a question whether this occurs as a primary disease, for it is seldom recognized until discovered after death as a part of a general tuberculosis, and even in those where I have seen it suspected during life, the patient has evidently been suffering from phthisis, or tuberculous disease of the abdomen. The malady does not exist as tubercle within the walls of the organ, but as a scrofulous deposit over the whole of its interior; thus, as you see here, the interior is filled with this yellowish soft granular matter; on attempting to scrape it off, it is found intimately blended with the tissue, and no distinct mucous membrane can be found between the deposit and muscular walls, the membrane having been lost or destroyed in the morbid process. In this case you see the disease does not affect the cervix, but stops at the os internum, a fact already observed by Dr. Oldham.[1] In all the cases which I have met with, there has been extensive tuberculous disease in the abdomen, and the ovaries and fallopian tubes have been especially involved; the latter have been much diseased and filled with the same scrofulous material, which makes me think that the disease, beginning within the abdomen, has involved these tubes, and then has crept down to the uterus; and so this organ is only secondarily affected.

UTERUS AFTER PARTURITION.

I shall hereafter speak of puerperal fever, but I may here bring before your notice the condition of uterus seen after labor. In an ordinary case you find the organ rather soft, and the interior presenting somewhat the appearance of an open wound; the surface is covered with a reddish-green fluid, and the spot where the placenta was attached is soft and pulpy. There are two opinions as to whether the inner surface constitutes the true mucous membrane or not: I have always thought, with the majority, that the decidua had been formed from the mucous membrane, and after labor this was destroyed and the bare muscular walls were left; there are some, however, who maintain that the mucous membrane still exists. The tissue of the walls of the organ, too, is undergoing changes. You know that, as the uterus grows so rapidly in pregnancy, new tissue must be formed, and thus the muscular fibres increase in number to a great extent; after labor is completed a rapid degeneration goes on; for if you examine the structure beneath the microscope, you will find the cells containing fatty granules, showing the degeneration which has already commenced, preparatory to their absorption.

In women who die after labor, various morbid conditions are found; in puerperal fever there is often no more local disease than an extreme softness of the uterus, so that the interior can be scraped up into a pulp; sometimes, however, pus escapes from the walls when cut, and in other cases where a local inflammation has been present, involving the pelvic organs, a greater degree of suppuration may exist; this spreading beneath the peritoneum, involves the broad supposed to be connected with a discharge of ova at the menstrual periods. Apart from this, we sometimes find clots associated with a sanguineous fluid in the uterus, in those who have died of congestive disease, as morbus cordis, or of fevers. After the blood has existed in the organ for some time, a change occurs in it, a decolorization takes place, and a puckering of the tissue, causing a resemblance to the *corpora lutea* found after a true conception, and they are thus styled *false corpora lutea.* I do not know that it is of much practical value to be able to distinguish a true from a false corpus luteum, seeing that the former is only found in the early months of pregnancy, and, therefore, can never be seen unless a fœtus be at the same time present in the uterus. We find, however, after the ovum has escaped, and its development is proceeding in the womb, that a change is also going on in the ovarium itself; a yellow exudation takes places in the tissue, which increases until it occupies half the organ, and the third month of pregnancy is reached; it then becomes smaller, and at the time of labor has almost disappeared. When at its full size, a round globular mass the size of a marble exists; this, when cut through, is found to consist of a softish yellow matter surrounding a central part of a pinkish color, the diameter of the latter being about equal to the breadth of the former; at a later period, the central part contracts with the membrane within; and what is then found is a yellow substance surrounding a white stellate or zigzag line. On the surface of the ovary, also, a cicatrix is seen. If you examine this microscopically, you will find, as you see in this sketch, a slightly fibrillated material, made up of nucleated fibres, nuclei, some transparent rounded bodies, and hæmatine. There is nothing discoverable which should give it the yellow color, except an altered condition of the blood. Opinions vary as to whether this material is deposited altogether outside the Graafian vesicle, or between its two coats.

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[1] 2261^{75}, and drawing.

I may here mention, that sometimes blood has collected within an ovary, and so distended it that a *hæmatocele* has been formed, and this bursting has caused death. Such cases are recorded, though I have never met with one; also a similar affection, called *retro-uterine hæmatocele*, has been mentioned by French physicians, where a cyst containing blood has formed behind the uterus.

INFLAMMATION AND ABSCESS.—Ovaritis is a primary and secondary affection. In many of those cases we meet with in the wards of local peritonitis in the lower part of the abdomen connected with some strain during a menstrual period, it is known that a primary inflammation of this organ has occurred. Also in connection with labor and pelvic cellulitis, the ovary may become involved, if it be not indeed the primary source of the mischief; in some of those lingering cases of suppuration in the pelvis and about the genital organs connected with parturition, it has been pretty certain that the ovary has been the starting-point of the disease, although, when a number of parts become involved in one extended suppuration, it is difficult to unravel the mass to bring this to the proof.

ADVENTITIOUS GROWTHS.—These, like those in the testis and other organs, may consist of cysts or solid growths, and the various combinations of the two; also the constituents of the cysts may differ, as may the solid growths. Thus we find *simple cysts* and *multilocular cysts*, *fibrous* and *cancerous tumors*, and *cysto-sarcoma* and *cysto-carcinoma:* if the cysts be filled with a jelly-like matter, the term *alveolar* is given.

Cysts.—I have already told you, when speaking of the kidney and testis, that much difference of opinion exists as to the nature of cysts, and there is no more uniformity of opinion respecting them in the ovary: the question still being whether they be mere expansions of the original cysts of the organ, or new formations. In very many cases there can be no doubt that the latter must be the true interpretation, for you actually find them growing in the walls of the parent cysts: moreover, that cysts can form independently, is seen in the fact of their production outside the ovary and on the broad ligament; these perhaps, however, correspond with the spermatocele of the testis, and are the mere enlargements of some fœtal remains. On the other hand, we are constantly meeting with ovaria which, when opened, show Graafian vesicles dilated with blood, and which at once suggest an origin for cystic disease; indeed, this is one theory for its frequency; these specimens show you these vesicles of various size filled with blood,[1] and when, indeed, the disease has got to the dimensions of a tumor, and is composed of distinct cysts, the same theory of their origin will in some instances hold good.

Simple Cysts.—Sometimes one large cyst grows in the ovary until the whole abdomen is filled with it;[2] a case of which we had the other day, where it formed a lining for the abdominal walls in front and sides, and reached the liver above. It is rare,

[1] 2227, 2231^{48}.

[2] 2243.

however, to find such a cyst perfectly smooth within, for it gener has a few smaller growths springing from its inner surface.[1] regards the structure of ovarian cysts, it varies with the kinc growth: in a simple thin cyst there would be merely the intei serous, the external peritoneal, and a middle fibrous; but in thi walled cysts, this middle fibrous coat is separable into layers, an have never seen any muscle which some have spoken of.

Multilocular Cysts.—It is a much more common condition find a large mass of cysts connected together, than a single alone: these, as I have just said, have been thought by some arise from mere enlargement of the Graafian visicles, while others they have been regarded as altogether distinct formatio and the latter indeed, in most cases, is evidently the more corr for you may see by opening the cysts, smaller ones springing uj the walls, and protruding into the interior.[2] Sometimes the wh tumor is small, and the cysts very numerous, so that a section a kind of honeycomb appearance.[3] In these compound cysts may also find some solid growths, as I shall presently show y The contents of these cysts are various: in the larger ones there light-brown and viscid fluid, resembling linseed-tea, while the sma may contain a jelly-like matter. Cases are recorded where ovar cysts have spontaneously ruptured into the peritoneal cavity, the patient has recovered.

Fibrous Tumors of Ovary.—Occasionally, though rarely, ovary may be converted into a very hard solid fibrous tum closely resembling those in the uterus;[4] more frequently these sc tumors are composed of a softer fibrous tissue, and are vascul resembling the uterine polypus, and in this one which I hold in hand the tissue was fibro-plastic, and exactly resembled the rec rent fibroid tumors which are removed by the surgeons; in t one a large cyst is formed, showing the general tendency of th ovarian tumors to cysto-sarcoma.

Cysto-sarcoma of the Ovary.—The most common form of disc of the ovary is this, where fluid and solid contents are combine The tumor consists of a number of cysts, of various sizes, often c large one at the upper part, and several smaller ones below; if th be opened, others will be seen penetrating from the walls, a within these still others. Many of these protuberances, howev will be found to be solid, and from their growing in the midst cellular structures, are generally very soft, and were formerly supposed to indicate cancer; they are white, composed of nucleated fibre, and highly vascular, and thus extravasated blood is frequently met with within the cysts. These cavities generally contain a brownish fluid, as I have mentioned, or a gelatinous matter, and this you often find sparkling with cholesterine. In some cases the growth from the surface of the cyst is of a papillary form, and instead of a rounded mass, presents this cauliflower appearance, as you see in these beautiful specimens.[1]

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[1] 2241. [2] 2241^{90}. [3] 2239^{56}. [4] 2216^{50}. [5] 2246^{35}

Alveolar is a very common form of disease of the ovary. I have already said that the most common is a multilocular cyst containing solid growths, liquid, and a semi-fluid or gelatinous matter. Sometimes we meet with cases where the cysts contain nothing but this jelly-like matter, or, as it is sometimes called, colloid, and therefore named alveolar disease,[2] or cancer, and supposed (though wrongly) to resemble the disease of the same name occurring in the peritoneum. This matter is transparent and viscid, like thick mucus, so that it is with difficulty removed from the cysts, and a strong stream of water upon it is barely sufficient to wash it out; mixed with this we often find also a substance of an opaque white color; this is probably merely a degeneration of the viscid matter, for the microscope shows in it large granule masses, as is usually met with in decaying tissues. In one case of this kind, besides finding a tesselated epithelium on the interior of the cysts, I also discovered ciliated columnar cells on some of the projecting partitions.

Carcinoma.—I do not think this is common as a primary disease; generally, when it is met with, it is in conjunction with cancer in other parts of the abdomen; the ovaries being affected in common with the lumbar glands, or having distinct growths within them.[3] When it exists as a primary disease it resembles the cysto-sarcoma, only instead of the solid growths, of which I have already spoken, being composed of nucleated fibre, they contain also rapidly growing cells, and then the disease is eminently malignant, and is propagated to other parts. In a case of this kind which occurred here about a year ago, I do not know that there was any suspicion of the disease being malignant except by its rapidly fatal termination within a few months; and after death the tumor was multilocular, and contained solid growths as in ordinary ovarian disease; but the liver, lungs,

[1] 2245^{64}.

[2] 2248^{48}.

[3] 2249^{32}.

and other parts, were filled with cancer. Such a case must be styled *cysto-carcinoma*.

Excepting in these last-mentioned exceptional cases of true cancer, ovarian disease is a local affection, there being no other disease in the body accompanying it; death is caused by exhaustion after repeated tappings, suppuration of the sac, extravasation of blood into it, &c. The tumor may be quite free in the abdomen, and attached merely by its peduncle; it very often happens, however, that it has formed adhesions to other parts, and especially to the anterior parietes of the abdomen, if paracentesis has been frequently adopted. It may, however, be connected with the intestines lying behind it, and very frequently the colon is attached to its upper part by the omentum, which closely covers it; sometimes also the ureters are found adherent, and if not, very frequently dilated by the pressure exerted upon them, and associated with this probably also dilatation of the pelvis of the kidney; the uterus too may have become attached, and if so, being forcibly pulled upwards, is much lengthened, as I have already shown you; the other ovary is generally healthy, and that it is really so is proved by those cases where, after the extirpation of the diseased organ, the patient has borne children, both male and female. We have specimens on our shelves showing instances where the ovarian cyst has formed communication with the colon, bladder,[1] &c.

Piliferous Cysts.—The cysts known by this name are characterized by their containing hair, also generally fatty matter, sometimes teeth and amorphous pieces of bone. They have no connection with the class of diseases of which I have been speaking, for in them it is very rare to find any of the substances I have named, whereas these are generally met with accidentally in persons who have died of other disorders; although, indeed, in one of our last cases it was the cause of death by rupture and subsequent peritonitis; they are not generally larger than the distended bladder, if so large. The most frequent contents are white fatty matter and hair.[2] The former is no doubt secreted by the sebaceous follicles found on the lining membrane of the cyst, and is fluid while the patient is alive, but becomes solid as the body cools;[3] in this bottle you will see the fat in the form of a number of perfectly round balls.[1] This fat perfectly dissolves in ether, leaving no membranous residue. The hair is found in bundles, and is generally, I believe, of a light color; when examined it is found to be pointed at both ends, but this probably has been acquired, for no doubt it has been formed on the surface of the cyst, and thrown off. In this specimen, which occurred lately, there is a good cuticular lining, and from it is growing a number of hairs; a section of the skin shows well-formed hairs in their follicles, and a very rich supply of sebaceous glands, which were no doubt constantly pouring out their fat. In this specimen there were also three teeth imbedded in a piece of bone, and which Mr. Salter thinks have been there many years, although they are the primary or milk teeth, and, what is remarkable, he thinks the teeth contain in their pulp true nerve substance.

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[1] $2228^{45}, ^{55}$.

[2] 2233^{50}.

[3] This has often been surmised, but never, as I believe, proved. Since this was written, a case has occurred where the contents of the cyst, when opened after death, were fluid, but soon solidified into a mass like tallow.

I will not take up your time with the various opinions given as to the origin of these remarkable tumors, containing within them the parts necessary for the construction of a fœtus, but I may mention three principal theories to account for them: one which Owen styles partheno-genesis, in allusion to many of the insect tribe who, from one impregnation, continue to bring forth successive generations; and thus in the human body, as an exceptional case, the fœtus when born of its mother shall contain within it the germ of another fœtus. The second theory, that of an included ovum; where, after the impregnation of the ova, one shall envelop the other, and thus one shall be found projecting from the other (as I shall presently show you), or be wholly included in it. In these cases, however, the included ovum is either a heterogeneous mass, or shows merely a resemblance to a fœtus, and may be met with in any part of the body. I should think neither suggestion would account for the common occurrence of these substances in the ovary, and their uniformity of character. It is more probable that a third explanation is the more correct—that they spring up independently in the ovarium, and indicate an attempt towards the production of a fœtus. A question, however, then arises whether this be due to impregnation, or merely to some morbid action in the organ; whether, indeed, an ovum has been impregnated in the ordinary way, but failed to escape, or whether, from some excited action, the ovary has attempted, though futilely, to produce a fœtus. If it be true, as is sometimes stated, that these have been met with in children, the first supposition cannot be correct; but in all cases which I have seen, the women have been married, and thus my own opinion has tended rather to the idea of these being extra-uterine fœtations, but failing to come to perfection. I shall presently show you that these developments outside the uterus generally take place in the fallopian tubes, and not in the ovary; but it may be that if an ovum be impregnated and cannot escape from the ovarium, and become surrounded by a vascular membrane, that development cannot proceed beyond a certain stage, and thus nothing more than a mere dilatation of the Graafian vesicle takes place, with a growth of the cutaneous tissues, with hair, teeth, &c. I repeat, however, that it is still an open question whether impregnation is necessary or not.

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[1] 2237^{35}.

MAMMA.

HYPERTROPHY.—Sometimes the breast grows to such an enormous size that its removal is required; in one case I remember of a girl, the organ, when excised, weighed many pounds.

ATROPHY.—In the decline of life the mammary gland atrophies, and in some old women, from a loss of fat and shrinking of the secreting structure, the remaining fibrous tissue has formed a hard lump, which might be called scirrhous; at least, I have been asked the question as to its nature, more than once in the post-mortem room.

INFLAMMATION AND ABSCESS.—This you are constantly meeting with during lactation, and more rarely as idiopathic or resulting from injury.

DILATATION OF DUCTS, OR GALACTOCELE.—Sometimes one of the ducts dilates, and the milk collects until a large tumor is formed; when opened, the fluid escapes, or, as in this specimen of Mr. Birkett's, a change had taken place in it, whereby the fluid parts were absorbed, and the solid mass of casein remaining was removed from the cavity. There may also be a general dilatation and disease of many ducts, as you see in this specimen,[1] which required removal.

NEW GROWTHS, OR TUMORS.—These are for the most part the chronic mammary tumors, or *adenoceles*, and *cancer*; both may contain cysts constituting *cysto-sarcoma* and *cysto-carcinoma*. The former class of tumors occur mostly in the young, while cancer is a disease of middle life.

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[1] 2290^{70}.

Adenocele, Chronic Mammary Tumor, or Cysto-sarcoma.—It was for a long time supposed that the tumors of the breast which were not cancerous, and innocent, were fibrous, and this term, or *sarcoma*, was given them, unless they contained cysts, when they received the name cysto-sarcoma. Since, however, the microscope has been made use of, it has been found, and we are especially indebted to Mr. Birkett for the discovery, that the tissue composing them resembles that of the gland itself, and thus the term glandular tumor is more appropriate, or (using the Greek synonyme) *adenocele*. You may remember, that in my lecture on the Bones I stated, that if from any local excitation of any part of the body a lymph or blastema should be thrown out, it was only capable of assimilating itself to the adjacent structure, if that was of a very simple kind, otherwise the new material would remain as cell or fibre; I stated that it was capable of becoming cartilage and bone, but as regarded the higher structures, the capability of development reached only the simpler kinds of glands, as the breast; and thus it was that the same cause which in a woman of middle age would give rise to a structure consisting simply of cells and constituting a cancer, would in a younger woman occasion a tumor, approximating in character to the gland itself. These adenoceles, then, are mostly met with in women in whom the procreative powers are in full force. The tissue, examined by the microscope, is not so perfect as that of the normal breast, for the larger ducts are mostly wanting, it being very rare to find any fresh formation of them, but their cœcal terminations are seen as in the healthy gland, and lined with epithelium in the same manner; it is these you must look for when you are examining a suspected specimen by the microscope, and you will soon discover the rounded terminations as you see the healthy gland drawn in your books: between these cœcal extremities you may find also simple fibrous or connective tissue, as in the healthy structure. It in proportion as this is present that the growth varies in compactness and general appearance; and this was the tissue which was supposed to constitute the main element of the new growth by the earlier microscopists. Mr. Birkett has, I believe, been in the habit of showing to his class how the various forms of these tumors resemble the artificial dissections of the mammary gland, according as more or less of this uniting fibre tissue is taken away. Thus, a section of a female breast shows merely a uniform fibrous surface; but if by dissection some of the areolar tissue be removed, it is found to be separable into lobes; these lobes again, by further dissection, may be separated into lobules; and these again, by a further removal of connective tissue, into the primitive acini or cœcal terminations of the ducts. Corresponding to all these degrees of dissection, so may the new tissues be developed in the adenoceles: in one case the gland tissue is at once seen by a magnifying glass, the ducts being free; in another, these being connected by fibre tissue, form lobules, which are distinctly seen by the naked eye when the tumor is opened; and in another case, the connective tissue so preponderates that the whole is conglomerated into one uniform mass. All these varieties you will see on our shelves, some of which, growing many years, reached several pounds in weight, and have very uniform solid structure,[1] while others display the lobules of various sizes. It is this latter character which will in most cases enable you to distinguish this form of disease from a cancer: in the latter the texture is hard, fibrous, of a uniform appearance, and emits generally a milky juice on pressure; while in the adenocele, when the interior is opened, you will find, by bending or stretching the tissue, that it is composed of a number of rounded portions or lobules; these, in some cases, can be only slightly defined until the tumor is thus forcibly torn open, while in other cases the lobules will hang out in the most beautiful manner, like bunches of grapes. This you will see in this specimen;[2] in this[3] the lobules are distinct, but smaller; and in this[4] the cut section is smooth, but you will see it composed of rounded masses. It was to these[5] small firm growths that the name chronic mammary tumor was given by Sir A. Cooper.

You will see that many of these tumors contain *cysts*, and that the lobules grow within them, constituting intra-cystic growths; I shall not allude to the various opinions as to the formation of these cysts, for I have already said, in connection with every organ, that there is no subject in pathology about which opinions so vary as this one of cysts. Suffice it to say, that you will find them present in many of our specimens of mammary tumors, and having growths within them. I think I am right in saying that Mr. Birkett's opinion is, that, as regards the breast, the fluid in the cyst is a blastema, which in some cases grows into a tough connective tissue; but in these instances remain fluid, after forming a hard boundary wall, into which the glandular structure pushes itself. I might mention that Müller's terms are sometimes used in connection with the morbid anatomy of the breast, and that he gives the name *cysto-sarcoma simplex* to those cases of solid adenoceles where simple cysts are found; *cysto-sarcoma proliferum*, where the cysts contain pendulous growths; and *cysto-sarcoma phyllodes*, where the cysts are filled with growths of a foliaceous character; these correspond to the two last specimens (but one) which I showed you.

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[1] 2296. [2] 2294. [3] 2296^{30}. [4] 2296^{20}. [5] 2293^{10}.

RECURRENT FIBROID.—These tumors, composed of a rapidly growing nucleated fibre, may occur in the breast or its neighbourhood, as well as any other part of the body; they are semi-malignant, constituting a class of growth intermediate between an adenocele and a cancer. The tumors in this jar form the successive growths which Mr. Cock removed from a woman whom many of you have seen in Dorcas' ward;[1] after the fourth removal she returned home; the disease, however, reappeared, and she has since died.

I will also draw your attention to the very interesting case of this woman who has just died under Mr. Birkett's care; for it shows that the various forms of growth may pass, by insensible degrees, into one another, and that thus it is often almost impossible to give a decided opinion as to the absolutely innocent or malignant character of the tumor. In the first growth which appeared in this woman's breast, there appeared to have been a mixture of nucleated fibre and gland tissue, showing on the part of the patient a disposition to the formation of a less highly developed structure than that of an ordinary adenocele; and thus, although in the first tumor some gland tissue was found associated with the nucleated fibre, and it was hoped that the case was simply one of a mammary glandular tumor, yet on the occurrence of a secondary growth, this was altogether absent; and so again on its third recurrence, when it was again removed, the tissue being then wholly fibre, as in Mr. Cock's case. The woman has since died, with symptoms which can leave no doubt as to the development of similar growths in the lung.

Cancer.—As I have before said, this form of disease depends mainly for its physical characters on the organ wherein it is developed, and thus it is that, in a part like the mamma containing so much fibrous tissue, the cancer is of the scirrhous kind; and it is most probable that the hardness is due merely to this fact, and that the fibrous network in which the cells are placed is not a new formation, but the original structure of the gland itself. Thus it is that if a soft or encephaloid cancer of the breast be met with, it is only when the tumor has grown to enormous size, or a secondary tumor has arisen after the excision of the breast; and in which case the stroma or matrix of the new growth is a new formation, and is of a comparatively slight kind. In these secondary growths, however, the tumors are at their commencement very hard, since they spring up in the skin around the cicatrix, which consists of a dense fibrous structure. In ordinary *scirrhous cancer* of the breast, the tumor is extremely hard, and the cut surface shows a fibrous surface, having a milky juice exuding, or sometimes distinct white masses of the new growth are seen in the structure.[1] Such tumors are removed every week, so that you will have ample opportunity of studying the appearances in the fresh specimens: large nucleated cells, of various shapes, being generally well seen. *Encephaloid cancer* rarely occurs in the breast as a primary disease.

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[1] 2300¹.

These cancerous tumors may remain for many years without inconvenience, and sometimes do not return after removal, but in most instances the whole history endures for only a year or two; the disease returns on removal, and after death the internal organs are commonly found affected; mostly the liver, lungs, and sometimes the bones of the skull and dura mater. The disease may be propagated through the body as independent deposits, but very often the interior is affected by a gradual progression of the cancer through the walls of the chest to the lung, or by the cervical glands to the mediastinal, and so to the interior of the body: on several occasions, however, I have examined persons where the local disease had caused death by exhaustion, and no cancer has been found internally, although the organs may have been otherwise degenerated. As I have before said, the general atrophy of the system, so often associated with cancer, is due immediately to the interference of the function of some important organ, and thus it is that in these cases of cancer of the breast, the bodies are often very fat, affording a strong contrast to those dead of cancer of the stomach.

Colloid Disease.—This occasionally occurs in the breast, and I have seen two or three instances of it; I believe it has always been associated with cancer. We have not a specimen of it in our museum, but there is a very good one in St. Thomas's.

[1] 2301.

Hydatid.—I need not inform you that the hydatid disease of the breast, spoken of by older writers, is what we know as cysto-sarcoma, and that real hydatid is a very rare disease. I have seen, however, two such cases; in this specimen[1] you see the parent hydatid cyst, or echinococcus, filled with smaller ones.

UTERO-GESTATION.

I shall not say much on this subject, as it is so fully treated of in the obstetric lectures; but there are certain parts of it which are constantly coming before the morbid anatomist, and upon which his department has thrown great light; for example, abortions, which formerly were thought to arise from some accidental circumstance, are now known to arise, in the majority of instances, from disease of the ovum.

OVUM.

I have repeatedly said, that most of the morbid actions in the body are chronic, and the same applies to abortion. It was formerly thought that this was always due to some violent exertion or excitement on the part of the mother, which caused the uterus to discharge its contents prematurely; but an examination of the ovum generally shows that the cause is a chronic one, and due to a change which must have been progressing for a considerable period. In some cases it is probable that from the time of conception the ovum is blighted, while the other structures may continue to grow; but all varieties exist in this respect; very frequently you will have ova shown you which appear healthy, they are of a triangular form, and correspond in shape to the uterus: sometimes the deciduous membrane is seen on the surface, though very often the exterior is formed by the chorion, and the decidua is afterwards discharged. Sometimes the aborted mass resembles a clot of blood, and its discharge is due to a sanguineous effusion in the deciduous membrane, which causes a separation of the chorion, and thus the ovum may be found in the clot. At a later period the cause of abortion will generally be found in a *disease of the chorion;*

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[1] 2291.

for since these important parts, containing the vascular loops through which the nourishment is conveyed from the mother to the fœtus, are affected, the ovum necessarily drops off. The disease is, no doubt, due in the first place to some constitutional defect on the part of the mother, seeing that abortion is repeatedly occurring in the same patient. In cases of this kind you will often find the villi of a white color, and these, if placed under the microscope, are quite opaque from being filled with fat globules and granules, the healthy cells having disappeared. In some of these cases, also, you will find the villi have dilated into small cysts approaching in character the form of disease I next describe.

CYSTIC DISEASE OF THE CHORION is one of the most remarkable affections of this structure; it was formerly called hydatid disease of the uterus, for it was supposed that the cysts were hydatids, and grew in the uterus; and indeed it was, no doubt, difficult often to ascertain their source, for when, after a supposed pregnancy, the woman was about to be delivered, and instead of a fœtus hundreds of bladders or cysts were expelled, it was thought that either these were parasites or a multitude of human ova. Very often the whole came away in a mass, and then their connection with the membranes was seen, as in these examples.[1] You see they resemble large bunches of grapes, and are of various sizes, though the cysts never reach any great dimension. If you examine them, you will find they are formed by dilatations of the villi, as in these drawings; not merely one at the end of each villus, but a succession of the cysts is seen, one above the other, resembling a string of beads; this is probably produced by one shooting out of another; for if you look at the extreme terminations of the villi, you find they constitute oval cysts, and smaller ones are shooting from them, reminding one of the growth of the cactus plant. Although the morbid mass may have been growing for several months, a fœtus is never found within it, notwithstanding impregnation appears necessary for its production.

The *amnion* may be diseased, but this has more to do with practical obstetrics; an excess of fluid is called dropsy of the amnion: sometimes blood may be found within it, and more rarely it has an adhesion to the fœtus.

EXTRA-UTERINE PREGNANCY.—Sometimes, instead of the impregnated ovum arriving safely at the uterus, it is delayed in the fallo-

[1] 2529^{72}, ^{90}, &c.

pian tube, where it undergoes development. It is said that this has happened in the ovarium itself, but I have never witnessed an example of it, unless indeed, as I suggested, the hairs, teeth, &c., sometimes found in ovarian cysts may be the result of delayed impregnated ova. Sometimes too, though rarely, the ovum may be arrested at the mouth of the fallopian tube, and thus it grows in the substance of the uterus, constituting interstitial pregnancy: of this we have one example, but of the tubular kind at least a dozen. You will see they are in all stages of development: in some, death of the patient has occurred as early as the sixth week, while in others the child appears almost full grown. When the ovum is arrested in the tube, all its parts become fully formed, as in the uterus; a good chorion surrounds it, which gathers nourishment from the tube, this having a large supply of vessels from the spermatic arteries. It has still to be determined in what way the connection is formed; it is the opinion of Dr. Robert Lee, that a little whitish soft material, which we find enveloping the chorion, is in reality a decidua, and from this he argues that the deciduous membrane, in all cases of pregnancy, is a part of the fœtal structure rather than the uterine. It is remarkable, however, that these cases of extra-uterine fœtation have been taken as a corroborative proof that the decidua is formed from the surface of the uterus (if it be not, indeed, its altered mucous membrane), for you will see in all these examples that the uterus is lined by a thick pulpy substance, having a cribriform appearance, or pierced with a number of holes corresponding to the tubular glands of the organ.[1] This is generally looked upon as the deciduous membrane developed in the uterus whilst the ovum is growing without; the uterus itself, you see, is enlarged, although containing nothing. It is a remarkable circumstance, that in several of our specimens the corpus luteum is on the opposite side of the body to the ovum, from whence it appears that the fallopian tube must have sent its fimbriated extremity over to the other ovary, in order to seize the ovum, and of the possibility of which I am not certain, or the ovum must have passed into the uterus, and then again made its exit on the opposite side.

In most cases, when the ovum has reached any size, and the chorion has begun to collect into one mass to constitute the placenta, the tube bursts, and death takes place very rapidly by hæmorrhage;

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[1] 2517^{20}.

if, however, only a slight lesion should occur, an inflammatory process may take place, causing an adhesion of the containing sac to surrounding parts, and so development goes on. When the full period of pregnancy is reached, and the fœtus is unable to escape (and the same occurs if it should die prematurely), it acts as a foreign body; adhesions are formed to surrounding parts, suppuration occurs, and the bones and other portions escape by openings in the abdominal walls, or by the rectum; sometimes, indeed, the fœtus has dried up or mummified, and remained inert for several years. I lately was reading a case where, at the end of gestation, labor pains came on, lasted a week, and then passed off; the movements of the fœtus continued for two months, and then ceased. The mother's health began to fail, abdominal pains coming on, and after three years, an abscess broke into the rectum, and some fœtal bones escaped; these continued to come away for another three years, when the woman recovered. In this specimen[1] you see a mass of bones which were long confined in the abdomen.

PLACENTA.

As the diseases of the ovum, and especially the chorion, have to do with abortion, so do the diseases of the placenta constitute, very frequently, the cause of miscarriage. Sometimes the changes in the placenta appear to be merely a premature condition of what is natural at the end of the ninth month of pregnancy; at this period the placenta separates from the uterus as fruit from the tree, or rather it has lived its whole period of life, and is suffering the same process of decay which the whole body does in its old age; thus an earthy matter is constantly formed in it,[2] and the *placental tufts undergo a fatty degeneration.* If this change should occur prematurely, a miscarriage is the result, and then, if the placenta be put under the microscope, these degenerative changes will be found to have occurred, or the morbid deposit even may be seen as white specks by the naked eye. Generally however, when this is the case, owing to the gradual separation of the fœtal and maternal structures, some *oozing of blood* takes place, and thus, besides much flooding, the placenta may be found filled with large clots of blood. As, however, the separation is gradual, the blood has time to undergo

[1] 2521^{51}.

[2] 2528^{25}.

various changes, the coloring matter is taken up, and the fibrin is left. Thus, as you will see in many of our specimens, the placenta, instead of being spongy and soft, is hard, and of a yellow-white color; the structure within is firm, and the vessels and villi are with difficulty separable, from being united into one compact mass. This is, however, only in parts, and thus several distinct circumscribed lumps or tumors are formed within it. If these be carefully examined by the microscope, by tearing up the tissue, the villi will be found filled with granular and fatty matter, and between them also a fibrillated and granular matter. You will see in the museum, that many of these diseased placentas were styled tuberculous,[1] for the reason that all unorganizable or amorphous deposit formerly received this name; but there can be no doubt that it is merely altered blood; the effusion being due to a diseased condition of the villous structures, and whether this indeed be owing to any delicacy of constitution, of a scrofulous or other kind, on the part of the mother, is another question. Subsequently, owing to the resemblance of this adventitious matter to lymph, it was thought that the consolidation of the placenta resembled a similar condition of inflamed lung, and thus the term *hepatization* was given. In most cases, however, there is no proof whatever that this is an inflammatory product; at the same time, an inflammation of the placenta, or *placentitis*, does occur, by which an exudation of lymph takes place on its surface, and binds it to the uterus. This is the cause of those rare cases of adherent placenta, and which some attribute to falls or injuries during pregnancy.

Other morbid conditions of the placenta, referring more to obstetrics, you will have pointed out in the midwifery lectures: such as the hollowing out of the organ by an effusion of blood between it and the uterus; also, its malposition in the uterus, as placenta prævia, &c.

UMBILICAL CORD.

The various affections of the umbilical cord will also be pointed out to you: such as disease of the bloodvessels, or their plugging; œdema of the cord; knots in it, &c.

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[1] 2528^{80}.

FŒTUS.

The diseases of the fœtus have, of late years, been regarded with great interest—not only in reference to any constitutional cachexia to which they may give rise, but as originating those organic changes at an early period of life, which we are in the habit of calling malformations; and when I speak of disease, I do not use it in that general sense signifying a mere deviation from the healthy standard, but, in most cases, as a positive malady, such as occurs in extra-uterine life: as, for example, a local inflammation, or a rheumatism. Many malformations however, you know, occur in the mesian line from an imperfect fusion of the two sides of the body, such as is seen in cleft plate, ectropia vesicæ; and others arise from excess of development.

Most of these malformations I have already spoken of in their respective sections, and I shall now just show you some examples which were not then referred to.

MALFORMATIONS.—Under *Bones*, I may mention, that sometimes the texture of the whole skeleton is affected, which has led to the supposition that children may be born with rickets. Deficiencies in the limbs have been accounted for by spontaneous amputations *in utero*, owing to the umbilical cord becoming twisted as a ligature around them; this, I believe, has been proved in some cases, and in many instances which we daily see, the stump is so good, and the bones so completely separated, that an amputation seems the only explanation.[1] A partially developed limb, however, must be accounted for on other principles, especially when a general uniformity pervades the cases where this exists, as, for example, in deficient fibula and toes on the outer side of the foot; a withered limb may arise from paralysis: for in such a case I have seen an atrophy of the opposite side of the brain as the cause; and in a similar case which I have already mentioned, where death occurred at birth, an effusion of blood had taken place in the brain, which was directly traceable to a fall the mother had received during pregnancy.

With respect to the *heart*, the various malformations, though so different in kind, can be for the most part well understood and classified on the supposition of some endocarditis during fœtal life; the proof, however, is still wanting that the fœtus has a rheumatic attack, although in one instance of malformed heart I have a history of the mother having rheumatism during gestation.

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[1] The absorption of the remaining part is with no more difficulty understood than the absorption of the placenta, which obstetricians describe.

I have already spoken of *brainless* infants, and cases where from a hole in the skull, a part of the brain escapes, or the membranes, constituting *encephalocele*[1] and *hydrencephalocele*, and of *spina bifida*, with its association with clubfoot.

In coming next to the *skin*, I find I have specimens which I have not yet alluded to, and amongst them are these three remarkable specimens which go by the name of harlequin fœtus, skin-bound fœtus, or *intra-uterine icthyosis*.[2] They are not very common, and therefore our museum may be considered rich in such specimens. They are all full grown, and the skin is covered with these fissures, which, passing in all directions, give the resemblance to a harlequin. The impression which is first conveyed to your mind by looking at them is, that the skin had ceased to grow at a certain period, while the fœtus within, continuing to increase, had burst its bonds in all directions, and thus the integument is cracked and fissured on the most prominent parts of the body. As I do not know that they have ever been described, I will point out more in detail some of the peculiarities which are seen in this specimen. The fœtus is of moderate size, fully developed, and the skin covered with fissures; these are more numerous in front than behind; the lines have a general tendency to be horizontal, or around the body and abdomen; on the chest they run in various directions, producing lozenge-shaped spaces; on the extremities their tendency is transverse, or around the limbs; in those parts where the body is flexed, the fissures are just in the direction which would follow forcible stretching. The face is fissured in all directions; on the head the cracks pass from back to front; on each side of the body the transverse lines are intersected by wide longitudinal ones. All the fissures have the appearance as if caused by stretching; in some parts the cuticle is merely affected, but in the deeper fissures the true skin is torn, and you see fibres passing from side to side, just as would be produced by a forcible separation of the skin. In one or two places it appears as if the cuticle had been destroyed and again repaired. The fissures are about one-eighth of an inch wide. The eyes are perfect, but the eyelids fixed back to the forehead, so that the conjunctival surface is exposed; no eyelashes; nose not much altered. The mouth kept open by rigidity of the skin around, which is as hard as cartilage, and forms a complete rim around it; there is no external ear; there is hair on the head; the fingers and toes are perfect, but are drawn together by the contractions of the skin. The internal organs have been removed, and therefore I know nothing of their condition.

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[1] 501^{30}, drawing.

[2] 2551^{77}, and drawing 498^{50}.

There are also other cutaneous affections which may occur in the fœtus: for example, you are all constantly meeting with cases of syphilis where the cuticle peels off, and here is a fœtus which was the subject of smallpox.

As regards the *lungs,* I have seen in more than one instance acute lobular pneumonia in a fœtus of six months' development, and which had been evidently dead some time before it was born. I may remark that I have never seen tubercle, and I believe that congenital tubercle has not been met with.

In the *peritoneum* many important changes occur from fœtal inflammation, and that this is not uncommon was shown many years ago by Dr. Simpson, who found it in children born of syphilitic mothers. I dare say many of you have thought the wretched puny condition of these fœtuses was quite sufficient to show their incapacity for life, but in truth there is very often an acute internal inflammation which has probably been the immediate cause of death; thus I have now examined five or six cases of syphilitic infants born dead, and in all these there was evidence of peritonitis; in two, old adhesions between liver and diaphragm, and in the others a general inflammation; in two, there was also lobular pneumonia. I have never yet met with any fibroid deposits in the liver, as have been described by some. In the adult you may constantly meet with adhesions, of which there has been no history since birth, and therefore probably having their origin in the fœtal state. It has also been suggested by Dr. Simpson whether the malpositions of the intestine are not due to a local peritonitis; and there can be little doubt that such is the case, for wherever these are met with, adhesions are always found binding the errant part in its new position; I allude especially to those cases of which I have lately seen three instances, where the ascending colon and cœcum were dragged over to the left side of the body; and you may remember that in one case you heard a discussion as to whether it was due to a malformation or to an inflammatory process; but, if we consider the altered position to be due to adhesion in fœtal life, both suppositions are true. It has also been thought that the non-descent of the testis may have been due in some cases to a peritoneal adhesion, especially where a coil of intestine has been found connected with the internal abdominal ring. Sometimes the intestine is open at the umbilicus, as in a case related in our *Reports;* this is occasioned by the umbilical vesicle, which in fœtal life is connected with the intestine, not closing as it should do.

MONSTROSITIES.—These may be of various kinds: sometimes mere masses of organic matter, with only a slight resemblance to a human being, and when constituting twin fœtuses, may be looked upon simply as imperfect growths. The most remarkable monsters, however, are those where a body exists with some extra portions attached, and great diversity of opinion is held as to whether these be due to an excessive germ power, or to a union of two ova, of which one only is perfectly developed. In the case, for example, of the Siamese twins, there can be no doubt that two fœtuses are simply united; while in the instance of six fingers and toes, the case cannot be looked upon otherwise than as an excessive development; but if an extra limb be found protruding from the body, a difficulty arises as to which theory to accept for an explanation. As regards the union of two fœtuses, it is clear in a case[1] like this, where the bodies are separate, but the heads amalgamated. It is evident too that one ovum may be included in another, and thus we have the case, as in the Chinese model of A-ke (if it be not altogether fabulous), where a well-developed man has the buttocks and lower limbs of another person protruding from his body. It only requires the limbs of such a case to be amalgamated to produce the three-legged monster which was made a public exhibition of some years ago; the middle limb had ten toes, and the child, which was alive, had double genital organs. A smaller limb is here represented,[2] and was removed by Mr. Cock about two years ago: it grew, as you see, from the lower part of the abdomen, and when cut contained a long bone, like the tibia, running through it; the fact of these occurring in the median line of the body, suggests that they are the external developments of a second ovum.

Sometimes this second ovum becomes wholly included in the other, and if so, is generally a mere shapeless mass, or has little pretensions to the figure of a human being; as you see in this model

[1] Drawing 522^{21}.

[2] 2546^{40}, and drawing $501^{60, 61}$.

of the curious fœtus found attached to the stomach of a bo also in these drawings of several other recorded cases. In th you see a quantity of bones which were taken from the butt a child, and which must have belonged to a twin fœtus. Wh come to smaller protuberances from the body, the question as I before said, as to their being portions of a second ovum, to excessive power in the single ovum; as, for example, curious body,[2] removed from the back of an infant, and whi designated a tail.

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[1] 2539^{30}.

[2] 2546^{50}.

PART II.

ON THE ASSOCIATION OF MORBID CONDITIONS.

Having considered the structural changes of the various organs separately, I will briefly point out how these are combined in the bodies which we are daily opening in the post-mortem room; and also what are the morbid changes we are likely to discover in the various diseases to which we give more general names than those indicating mere local structural affections. For you must be aware that a simple demonstration of the morbid anatomy of particular parts is only one step towards a knowledge of pathology; but a grouping together of the various diseased structures, such as are found naturally associated, raises us a step considerably higher—so that I believe a thorough acquaintance with the various morbid processes, in any particular case, would lead us very close upon its true pathology; our present means of investigation, however, will not allow us to demonstrate all the various pathological changes occurring in the body; for there are many, especially those in the nervous system, of which we are at present profoundly ignorant; and even should there exist evident morbid conditions, I warn you not to take them as ultimate facts, and think that you have arrived at the true pathology by such means; for very often the great mass of disease which we find in a body is secondary, or only an extreme development of the original affection which set the whole morbid process in action: it is this confounding of two things which has brought some odium on the science of morbid anatomy; you need not, however, be alarmed at studying it too much, for the subject presents great facts which cannot be ignored.

General Appearance of a Body.—You may sometimes be required to inspect a body about which you know nothing, as we have constantly to do at this hospital; and therefore you should, in the first place, thoroughly examine the exterior before you begin to look inside. Seek carefully for injuries, bruises, or the like, and never forget, in the absence of all other cause of death, to examine the cervical spine for fracture, or the larynx for a foreign body. When the person appears to have died in good health, you may suspect an accidental death, or an acute disease, or one which has proved fatal suddenly; for if the body be wasted, you at once discern that a long-standing ailment must have existed, and then it will be well to put the body through a course of physical examination, as you constantly see done here. In chronic disease the emaciation varies in different affections; the most common cause of it is phthisis; but it is not so excessive as when death has occurred from abdominal affection as of stomach, mesentery, &c.; in phthisis the face retains a certain amount of plumpness, while in abdominal disease, where actual starvation takes place, the wasting is much more, the temporal muscles atrophied, and the fat removed from the orbits, so that the eyes will seldom close; the skin too is soft in phthisis, while it is often harsh in the other affection. You may notice too, with advantage, the condition of the hair in these wasted bodies, and which always tells a tale of long-standing disease: instead of its presenting the curly crisp appearance of health, it is long or lanky; and this is especially observable in the beard and on the pubes: you may also notice that the hair has grown considerably on the chest in phthisical subjects. We then generally percuss the body, and if we find the chest dull on one side, we obtain a notion of phthisis; if with emaciation, the disease is chronic, if there be not much wasting, it is more acute, or acute upon old; added to this, if we open the mouth, and again strike the chest, we may often obtain the sound known as the *bruit de pot felé*, generally indicative of a cavity; sometimes, to our surprise, we find the chest tympanitic, denoting a *pneumo-thorax*, and thus explaining the sudden death of our patient since we saw him last. In a case which occurred here the other day, where the chest was dull and the body not wasted, and at the same time an herpetic eruption existed on the lip, the diagnosis was *pneumonia*, and which turned out to be correct. In those dead of various chronic diseases, we may often find that pleuritic effusion or pneumonia has ensued since the last time we were enabled to examine the patient alive. As a good example of the value of physical examination, I will mention a case which occurred here about a year ago, and where the diagnosis made after death proved to be correct in every particular. A lad came one Wednesday morning to be admitted, and died in the taking-in room. Before hearing from his friends, we proceeded to examine the body. On percussing the chest, the left side was found tympanitic, indicating a pneumo-thorax, but then the body was not sufficiently wasted for phthisis; and this sign suggested, therefore, an acute disease of the lung, which had ended in rupture of the tissue; as this, however, does not occur except in lobular abscess from pyæmia, a local cause was looked for as a source of purulent infection, when all that we discovered was a discharge from the ear, and on placing the fingers on the neck, a general swelling was found, and an induration of the jugular vein; it became then tolerably clear that a chronic otitis, with diseased temporal bone, existed; that the lateral sinus had become involved; that phlebitis had extended down the jugular vein to the heart; and so the lung had been affected with abscesses, one of which had burst, and caused the boy's death by pneumothorax. On subsequently opening the body, the morbid conditions were found true in every detail, and the whole history was exactly as suspected. Many similar instances I might mention, proving the value of physical examination.

Sometimes we have a person brought from the street, who has died from *pulmonary hæmorrhage*. If the body be wasted, we suspect phthisis; if not, aneurism. In *brain diseases*, the body too is often extremely wasted, but the emaciation, as far as I know, offers nothing characteristic, though, if paralysis or softening of the brain has been present, you may find rigidity or contraction of one particular limb, or hands clinched, and thumb drawn towards palm, and generally a greater proportional wasting of the muscles than in other cases of emaciation; and the abdomen is often remarkably flattened or hollowed out, and you may find irregularity of the pupils. As regards this latter condition, I would say, it is only in exceptional cases that any value can be set upon the state of pupils after death; the rule being that an ordinary or moderate state is that found: the tendency being at death for the two antagonistic sets of muscles of the iris to neutralize one another. There are various other conditions of body to be observed; thus, if it be not wasted, and be young, it is tolerably clear that death has occurred from some acute affection; we may then also look to the skin, and sometimes find a petechial mulberry rash covering it, denoting a *typhus fever*, and also a general lividity of the surface. In typhoid fever no rash would be present, except perhaps a slight purpuric mottling of the legs. If there be an unhealthy sore on the body, and especially if a bone be exposed, we may suspect pyæmia, and the suspicion is strengthened if the body have a yellowish tinge.

In *abdominal diseases* the distended tympanitic abdomen may suggest the idea of *peritonitis*, particularly if the countenance express what we call anxiety, and still shown after death by the sunken eye, &c. In cancer of the stomach, the wasting is the most extreme that we meet with; various tumors may be felt after death as during life, and attempts at diagnosis should be again made.

If the body be dropsical, it denotes, in by far the majority of cases, visceral disease (it may accompany mere anemia and cachexia); and, if all parts are affected, it shows the cause is not a local one, but in the blood; and we therefore, if we see the arms, face, scrotum, &c., swollen, pronounce in favour of renal disease. If the lower part of the body be only dropsical, as legs and genital organs, especially the former, we suppose the dropsy is due to a mechanical cause in the chest, and then comes the question—is this due to primary pulmonary obstruction, as bronchitis, or secondary obstruction, from heart disease? If there be great lividity of the face, we may suspect mere bronchitis; but if this be less, and if the skin of upper part of body be yellowish, denoting hepatic engorgement, we may be pretty sure that the person has died of morbus cordis. The appearances in such a case are so well marked that you may almost always recognize a heart case before you open the body. If the abdomen be alone dropsical, as in *ascites*, a liver disease is suspected, or a chronic peritoneal affection.

Besides noticing emaciation you should observe whether there be a superabundance of *fat*, for this denotes a morbid condition of system which accounts for many deaths taking place in persons after slight injuries or surgical operations, such as hernia. You may often notice in persons advanced in age a large amount of fat beneath the integument of the abdomen, as also a large quantity within, occupying the mesentery, omentum, region of kidneys, &c.: this is one of the conditions of age; but you may occasionally observe the same in younger persons, especially those who have been much addicted to intemperance, and more particularly to beer-drinking, for spirits, unless indulged in very largely and for a short time so as to prove rapidly fatal, tend to wasting of the body. You will also get accustomed by experience to the quality of the fat, there being a firm whitish adipose tissue which denotes health, while there is a yellow oily form which may be looked upon as morbid. You should also examine the eye for the *arcus senilis,* which generally indicates senile or fatty changes throughout the body. The *muscular tissues* should also be noticed; there is the large red muscle denoting the healthy state, and the atrophied pale muscle showing its long-continued inactivity, and which, perhaps, also may have undergone a fatty degeneration.

Rigor mortis should also be looked for, and if present shows that death has not long occurred; but at what time the state disappears I cannot positively say, never having kept any record, for it varies with the mode of death and state of the weather; I shall refer to it again under particular diseases.

I shall now again run through the various sections, so that we may ascertain what are the morbid conditions found in the body connected with the different diseases which we style local, but more especially to consider what is found, and what is not found, in those affections which own only some general name.

DISEASES OF THE NERVOUS SYSTEM.

I have already said, that when you find the *dura mater* affected you must look to the bone as the cause; also a simple arachnitis, in which the inflammatory product is *interarachnoid,* is generally secondary to dura mater, arising from injury or disease of the bone. A *simple meningitis,* where the inflammatory product is found beneath the visceral arachnoid, may occur from injury, and idiopathically from unknown causes; it is not a common affection, and when met with, all other parts of the body may be found healthy. *Tubercular meningitis,* or acute hydrocephalus, I have already described as a peculiar affection of the brain associated with tubercles; so characteristic is the affection that it would probably deserve the name, even if no tubercles existed, provided they were present in other parts of the body, although I have never yet failed to find them; you may always discover them, too, in other parts, and in no case have I yet examined where they were not present in the lungs; in some cases the cerebral affection is associated with a general tuberculosis of the whole body; but the brain, being the most imas white specks upon the membrane; it has been said, that not only does the brain contain alcohol, in those who have died during a fit of drunkenness, but that the substance becomes hardened in habitual drunkards, but of this I know nothing. I think, however, that there is a disposition to induration of the tissues, and I am not sure that intemperance does not lead to disease of the arteries, chronic laryngitis, and enlargement of the heart from degeneration of the muscular fibre.

Epilepsy.—Similar remarks hold good with respect to the pathology of this disease, as the one of which I have been speaking; so that it is necessary first to define the term, and discover what morbid conditions cannot be looked upon as the cause of this disease. Thus, symptoms resembling epilepsy may arise from various causes, as suppression of urine, or from positive disease in the brain, as from tumors, and thus formerly spiculæ of bone on the meninges were considered as among the causes of this affection; as, however, in the most marked examples of epilepsy, and where the disease has been of years' duration, no very evident alteration is discoverable, we call those only true cases of epilepsy where there is an absence of all manifest change in the brain, and if we discover a tumor or exostosis, we should designate the disease by these names, and not by epilepsy. It is necessary thus to limit the term and confine it within certain boundaries, before attempting to study its pathology; and this is no artificial distinction, for, as Bright long ago observed, in epilepsy arising from a local disease the consciousness is generally present, which is not the case in the true form of the disease. In those who have been subject to epilepsy, no constant appearances are found, although very commonly those changes are seen in the cranium, brain, and its membranes, which are generally supposed to denote a chronic inflammatory process; but then the question remains whether this may not be rather an effect of the epilepsy than be a cause of it; thus the calvaria, when removed, is not unfrequently found very dense and heavy, though this is by no means always the case; at the same time, the dura mater is much thickened, and also the arachroid opaque, and the brain itself rather atrophied; and sometimes the surface of the ventricles presents a granular appearance. I have never seen but two deaths during the paroxysm, and there the morbid appearances were those due merely to asphyxia, great congestion of all the organs, brain with its vessels full of blood, lungs highly congested and exuding serum, and bronchial tubes full of frothy mucus; moreover, it could not be said that the brain was more congested than other viscera. Where patients have died with epileptiform symptoms arising from a local cause, this has generally been a tumor near the surface of the brain, or local disease of the bone, which has caused adhesion to neighbouring membranes; and it is in this situation, no doubt, where the deposit exists which causes the fits observed in syphilitic cases.

Chorea.—I have seen several fatal cases of this disorder, and the post-mortem appearances, as in many other nervous diseases, are very slight, the brain and spinal marrow presenting no abnormal condition, except in one instance where the latter happened to be softened; it was thought, at the time when this death took place, that softening could scarcely occur in an affection marked by such violent action of the nervous system, and which should have rather shown itself in a paralysis; all modern pathology, however, has proved that irregular muscular movements denote a tendency to impairment and weakness of the nervous centres, rather than an exalted action; and from the fact of a very similar case having also lately occurred, I should advise you to look still more narrowly to the medulla, to discover whether or not there be any structural changes. The only constant morbid appearance in these cases has been in the heart; you know very well that very often in chorea, a mitral bruit is heard, and the question has not yet been answered whether the cardiac affection is a temporary or organic one; it is remarkable, however, that in all the fatal cases of chorea which have come under my own notice, a small row of bead-like vegetations has existed on the mitral valve. Death seems due to exhaustion, for the body is generally considerably wasted, and the skin over the joints and prominent parts of the body is abraded, from the violence of the movements during lifetime.

Paralysis Agitans.—I have never yet had an opportunity of examining a case where this affection existed, but I may remind you again of what I just now said, that our pathology is now in accordance with the popular notion of palsy, a term which does not so much represent paralysis, as a shaking disorder; and, indeed, the two conditions are closely connected, for inasmuch as the well-knit and steady limb denotes strength, so does constant movement or tremor denote weakness, and thus in this affection you observe the patient to be old and feeble; and if you ever have an opportunity of making a post-mortem examination, you may look not only to the muscles for degeneration, but to the spinal nerves and cord itself, for any atrophic change.

Tetanus.—In this disease, too, the affection of the nervous system is able to kill without leaving any traces behind, and thus in general terms I may say that the body is healthy. For this reason it is that it has not been the rule to examine those dead of this disease, seeing that no result ever came of the inspection. Showing, however, the value of knowing the appearances found in dead bodies, be they only of a negative kind, I may mention a very important circumstance which arose during the trial of Palmer, as to the state of the heart in tetanus, compared with that in death by strychnine; and witnesses were examined as to its condition in this disease, but I am sorry to say facts were not forthcoming as they should have been. It was argued that different effects were produced by tetanus and by the poison; but the latter has been shown to kill by paralysing the muscles of the chest, or by asphyxia, without having any direct influence over the heart, which is not, therefore, found spasmodically contracted; and tetanus kills through the respiratory organs in the same way, as I have witnessed now on more than one occasion; in one case the man took a deep inspiration, the chest became locked, and he was dead; in a similar case, being by the bedside, I placed my hand over the heart, and it continued to beat long after breathing had ceased: there is, then, no spasm of the heart, but the organ becomes gorged with blood, as you might imagine in death by asphyxia. Thus in several necropsies of tetanus which I have made, the heart has been found gorged with blood on the right side as well as the veins leading thereto; the left side has also contained it in less quantity: in these cases, however, the blood was always fluid, or only a very small and loose coagulum existed. I am strongly under the impression that this is always the case where death has occurred immediately through derangement of the nervous system. It is said, though I hardly know with what truth, that in those struck with lightning the blood is found fluid. The lungs in tetanus are highly congested or gorged with blood, and all the other organs in a similar manner. The brain and spinal marrow appear quite healthy. The muscles are dark red, and sometimes found lacerated from the violence of the spasms, especially those of the back, but sometimes the rectus abdominis has been found torn. The general appearance of the body presents no peculiarities, as far as I know; the rigor mortis exists at the usual time at which the bodies are opened, and is not greater, as far as I have perceived, than in other cases; but whether it comes on or departs at any unusual period, I have no facts on which to form any opinion. You should always examine the wounded part, which is generally hand or foot; for though it is stated that the nerve is healthy, it is possible that, by repeated and more minute investigations, some morbid condition may yet be discovered; and I myself, on more than one occasion, have found foreign bodies, as splinters of wood, in the wound. As regards inflammation of the nerve, I know not of what importance that would be in the production of the symptoms; but you may remember, in one of the last cases of tetanus which occurred here after amputation, we found the sciatic nerve covered with granulations of lymph; I do not, however, attach much importance to this, which I believe is a usual occurrence in all stumps, and constitutes a step in the production of the bulbous ends of nerves, so often met with.

Hydrophobia.—It has been thought by some that this disease is none other than tetanus, but the general belief is opposed to this; and as during life the dread of water is so characteristic of the affection, so after death the mouth, tongue, and pharynx, are the only parts of the body which present a marked morbid condition. This was observed by Morgagni, who describes an inflammation of the trachea, fauces, &c., in a case of hydrophobia. I have never seen but one post-mortem examination of a case of this disease, and this was in a young man who died in this hospital, about three years ago, and ten hours after the commencement of the symptoms. A scar existed on the thigh, being the remains of the bite which he had received several months before. The body was livid, particularly the face, which looked like strangulation. The blood was of a dark color, and quite fluid, both in the vessels and in the heart; the lungs were much congested, and posterior parts of a very dark color and soft; the bronchial tubes also congested, and of a dark color. The kidneys, liver, &c., all congested; and the brain and spinal cord showed no other appearance than congestion, due to the mode of death. The larynx was healthy, but the pharynx presented a very unusual condition, being dilated, as if violent muscular contraction had occurred in it; the mucous membrane was swollen; the glands were enlarged and covered with thick secretion, as were all the glands at the back of the tongue.

Mania.—You must remember that the brain may be so affected as to cause death, and yet present no changes which are appreciable by the naked eye, or discoverable by any of our usual tests. Sometimes the morbid condition, whatever it may be, is allied to an inflammation or cerebritis, but death occurs before any products have yet formed; generally, however, I think the change is too subtle to be called inflammatory, and is one rather of a molecular change, and this, I think, because there is often an hereditary disposition to insanity, and the symptoms which exist during the acute attack are those more of mania than any cerebral disease of the ordinary kind. I have seen three instances of girls, who had shown a disposition to insanity, seized with acute mania, which was quickly fatal, and yet the brains of two which were examined showed no signs of disease. The symptoms in all these cases, at the outset, were thought to be due to hysteria.

In *chronic mania*, and *various forms of insanity*, different conditions are found: in general language it is said that nothing is discoverable in the brains of mad people, but what is meant is, that there is no local manifest disease; and that the changes cannot be much, or not appreciable, is only what might be thought probable, when we know that a person may live a tolerably long life, and yet be mentally deficient. In cases, however, of long-standing dementia, a general atrophy of the brain is very frequent: the brain shrunken, the convolutions deep, and much fluid beneath the arachnoid which is stretched across them; in some cases I have seen so great wasting of the anterior lobes that a large hollow space has existed in the cranium: together with this, the membrane may be sometimes found thickened, and the ventricles present a granular surface; the calvaria varies very much, being sometimes very thick, and at others very thin, being diaphanous when held to the light; and very often, if skull be thickened, the dura mater is adherent; if general paralysis have been present, the spinal cord may also be found correspondingly atrophied.

Spinal Disease and Injury.—Death occurs in these cases through the instrumentality of some organ which has become impaired in function by the loss of its proper nervous influence; for it is still a question how far a disease of the spinal cord can, in itself, lead to a fatal result, without the mediation of a local cause: thus the consequences vary with the seat of the disease or injury. If a fracture of the spine occur to the upper cervical vertebræ, death is instantaneous; if it occur below the fourth, so as to leave the phrenic nerve untouched, the chest is paralysed, and respiration is continued entirely by the diaphragm; but then death takes place in a few hours. In such a case the lungs are found excessively gorged, and the blood almost starting through the tissue, and, indeed, sometimes is found mixed with frothy mucus in the bronchial tubes; as the injury occurs lower down in the dorsal region of the spine, so is the chest less paralysed, and life is prolonged for a much longer period; if the injury be too low to cause death very quickly from paralysis of chest, then other changes occur in the paralysed parts below, but much more slowly, and those which suffer more especially are the bladder and the back: I have already alluded to the question whether the inflammation of these parts be due immediately to the nervous influence being removed, or merely from the retention of urine in the case of the bladder, and continued pressure from immobility in the case of the back. From the bladder being thus paralysed, the urine is retained, becomes ammoniacal, and the mucous membrane inflamed; this condition may proceed up the ureters to the kidneys, which, thus becoming involved, suppurate, and death speedily ensues; and this suppuration of the kidney is, I believe, the most frequent cause of death in all cases of injury to the spine which have not occurred high up, and more especially in cases of chronic disease of the spinal cord. At the same time with the paralysis of the bladder a bedsore forms, and this is a cause associated with the renal disease which may lead to a fatal result; sometimes the bedsore is sufficient to kill by itself, and I have even seen this so extensive that, the sacrum becoming necrosed, it has set up a secondary disease of the cord below the original one. In most cases, then, of fatal spine disease you may find the cause of death in inflammation of the urinary organs, and bedsore; occasionally the suppuration has infected the blood, and lobular abscesses in the lungs may be met with: in one case I have seen such extensive sloughing of the bladder that a general peritonitis was set up.

DISEASES OF THE HEART.

Unless death be sudden in heart disease, the appearances, in nearly all cases of this affection, are much the same; indeed, in no instance of disease that we examine, do we find the morbid conditions so remarkably uniform. If the cause be a contracted mitral orifice, an engorgement of the whole venous system ensues, and the same occurs should the aortics be primarily involved, or even if the heart be simply enlarged, but attended with valvular imperfection. The conditions produced on the form of the heart by the various valvular affections I have already mentioned, as well as the outward appearance of the body, characterized by the dropsy of its lower part, and the slight yellow tinge of the upper. The same congestion which leads to the exudation of *serum* in the legs, also produces some effusion in the abdomen; but this is generally not to any great extent; there may also be some fluid in the chest; and the side on which this occurs is often determined by the position of patient during the last few days of life, and sometimes by the fact of pleuritic adhesions existing on one side, and thus necessitating the effusion on the other; this, too, may be caused, though not yet actually proved, by the pressure of some particular part of the enlarged heart upon the root of the lung. The *lungs* themselves, from being chronically congested, undergo that peculiar induration which I have mentioned under the name of splenization; and if the pressure of the blood be very great, the vessels (probably the pulmonary veins) give way, and apoplexy of the lung is produced; and at the same time, the bloodvessels may be found plugged with coagula; the *bronchial* membrane is highly congested, and tubes filled with mucus; the *liver* is large, and of a dark purple color externally, and within, is seen to be in the condition known as nutmeg; the *spleen*, like all the organs in the body, is indurated, and sometimes contains fibrinous masses; the *kidneys* also are very hard, and sometimes contain fibrinous masses; the latter most usually occur where the diseased valves are covered with vegetations, but I cannot say that this is invariably the case. The mucous membrane of alimentary canal is also highly congested; that of *stomach* is of a dark red color, covered with tenacious mucus, and the membrane sometimes abraded, or in that condition known as hæmorrhagic erosion; the *intestines* are also much congested, as well as the *uterus*. All the appearances I have named are generally found in those who have died slowly of heart disease, and point to excessive congestion, leading to induration of the parenchymatous viscera, a serous effusion from the serous membrane, and a mucous from the mucous surfaces; the condition of these membranes, together with the secretion, indicating a state which sometimes can be called by no other name than inflammatory.

Acute pericarditis is often a cause of death in Bright's disease, and as a sequel to other chronic affections; but probably, in its simplest form, is rarely or ever fatal as an idiopathic affection. If rheumatism, for example, is fatal by a pericarditis, it is usually on account of the pleurisy which is combined with it; or if it should cause death alone, it is generally by effusion, which embarrasses the heart, and not by the intensity of the inflammation. Judging, therefore, from my own experience, a simple pericarditis is rarely fatal, except as a sequel to other disease; but if so, it is not so much from the violence of the inflammation as from the fluid effusion which results; the latter, therefore, may generally be expected in a case of rheumatic inflammation.

In *aneurism of the aorta,* very often no other disease of the body is found, not even in the arteries; but in advanced age, aneurism may be associated with various degenerations of the tissues, as fatty heart, granular kidney, &c.

In two fatal cases of *angina pectoris* which I have seen, the heart was very fatty, and the coronary arteries were ossified; one of the specimens I have already shown you.

DISEASES OF THE RESPIRATORY ORGANS.

Bronchitis.—Although this disease is one of the most common in this country, yet, perhaps, is rarely fatal in its acute form; and even when death is produced by chronic bronchitis, other morbid affections are associated with it; thus it is very frequently the attendant of many other diseases, such as morbus Brightii, and the immediate cause of death in them. The fatal cases of simple bronchitis are generally those where a subacute attack ensues upon an old; and in such you very frequently find emphysema of the lungs, and a hypertrophy of the right side of the heart. In consequence of the mode of death, all the organs are gorged with blood, and the legs may be œdematous; but although, as I have stated, long-continued congestion of the liver leads to the nutmeg condition, it is remarkable that this is rarely seen except in the incipient stage in bronchitis. In death by this disease, you must open the tubes, and particularly examine the smaller ones, for these you may find dilated, or filled with purulent mucus; but if you are merely content with cutting across the lung, you may be at a loss to account for the fatal result; should you, moreover, find the right side of the heart hypertrophied, you will be sure of some long-standing impediment to the circulation.

Pneumonia.—In by far the majority of cases where pneumonia is found, you will also discover some pre-existing and more chronic disease in some organ of the body. In primary pneumonia, the lung is found hepatized at the time of death; and on its surface there is generally more or less lymph; all the organs are gorged with blood, as might be supposed, and probably even some change has occurred in their secreting structure, judging both from appearances after death, and symptoms observed during life; thus a jaundice is sometimes an accompaniment of pneumonia, although after death no marked change is discoverable in the liver tissue besides engorgement; the kidneys too, which very probably produced albuminous urine during life, are now found swollen, coarse-looking, and beneath the microscope showing the tubules filled with granular contents. If any urine be in the bladder, you may examine it for chlorides, which are said to be in very small quantity, or altogether absent in this disease; this I can verify from having tested it in many cases. The best way is to make a comparison with some healthy urine, when you may be sure of the result; if you take the latter in a tube, and add some drops of nitrate of silver, a dense curdy white precipitate will occur, sufficient to fill half the tube; but if you take some of the pneumonic urine and test it in the same way, first adding a little nitric acid to dissolve the phosphates, and other salts of silver, you will find merely an opacity occur. It is not yet proved that this absence of chloride of sodium does not also exist in other febrile disorders; but at present, I believe, the theory is, that all this salt is exhausted in the rapid cell formation which takes place in the lung, and thus the blood is deprived of it, and consequently the urine.

Phthisis.—This term is now generally used to denote any chronic disease of the lung of the tuberculous or inflammatory kind, and thus, according to its variety or chronicity, so will the general appearance of the body vary. In an ordinary case of some months' standing, where the patient is of the usual scrofulous habit, we find the *lungs* disorganized and adherent to the chest (this is a conservative process, and prevents pneumo-thorax); generally the upper part of the air-passages is the subject of tuberculous ulceration, especially the *larnyx*, as before mentioned; the lower end of the *ileum*, with the cœcum, in like manner is found to be ulcerated and having tuberculous matter at the base of the ulcer, and very probably the *liver* will be fatty; in most cases then, of phthisis of an average duration, these four organs will be found affected; the first three as an essential part of the disease, and the liver secondarily. In exceptional cases other organs, as the brain, are affected; when a patient long wasted in phthisis is *in extremis*, the wanderings of the mind merely denote an impoverished brain; but if cerebral symptoms should come on at an early period of the affection, we suspect tuberculous meningitis, and thus is sometimes met with as a complication of phthisis; in most cases, however, the brain is found merely pale and wasted, and its place occupied by increased effusion of serum. As regards the *heart*, some observers have considered it to be smaller and some larger than in health; my experience is, that in most cases it has no disposition to atrophy as in many wasting diseases, and that in some forms of phthisis (those which show a chronic pneumonic induration) it is hypertrophied on the right side, and thus, if a large number of cases be taken, the average would give a slight excess in weight. The *kidneys* are generally above the usual size and weight, as if they had been overworked, as no doubt they have been during the wasting of the tissues. It will thus, be seen that though there be wasting of the body in phthisis, there is atrophy of the organs themselves, which all weigh heavier than in health. As I have already described under Phthisis, the ordinary form of disease, which is of average duration, is of a tuberculo-pneumonic kind; but there are also extreme cases, which are purely tuberculous and purely pneumonic: in the former, you may find all the viscera occupied by scrofulous matter, as well as the lymphatic glands; in the chronic pneumonic forms, which can scarcely be designated by the name of phthisis were not a similar condition so often found associated with the ordinary forms of it, the lungs have, perhaps, been consolidated in parts by dense black tissue for many years; in these you will often find the bronchial tubes dilated and the right side of the heart hypertrophied, but probably no other disease in the body.

tion which has been the precursor of death, or it may be associated with various other ailments. In its simplicity the disease may gradually progress, until from some cause the function of the organ, or of any healthy part which is left, should suddenly cease, when death takes place from what is called uræmic intoxication, and nothing is found but an atrophied state of kidneys, the body being spare or wasted. This small granular organ, of which I am now speaking, is generally associated with diseased arteries and hypertrophy of the left ventricle; the connection between these is not quite clear, and at present forms one of the disputed points in pathology: some thinking the heart disease precedes that of the kidney, and others the contrary. Whether, in this variety of disease, the hypertrophy of the heart is due to the affected bloodvessels, and so caused by a retarded circulation, or from any other cause, I have no doubt that the kidney and the vascular affection precede the cardiac, and I think, very probably, the difference of opinion which has been held on the subject is owing to another class of cases being confounded with them; those cases I have already mentioned, where, in ordinary fatal heart disease, the kidneys, from great congestion, become altered in their secreting structure, and even in long-protracted cases become changed into a state known as the first stage of Bright's disease. To leave, however, the question, remember that with the small degenerated organ you may generally expect to find diseased arteries and hypertrophied left ventricle. These may be the only morbid conditions found in the body, but numerous secondary effects may occur as a cause of death—viz., pericarditis and other serous inflammations, or pneumonia and bronchitis: owing also to the disease of the bloodvessels, a softening of the brain or a sanguineous apoplexy may be present.

I might here mention how frequently these degenerated kidneys are found in patients who die after injuries and operations, and is one great cause for the mortality in the surgical wards.[1] It is remarkable what severe accidents may occur with impunity to persons who are in good health, as we daily witness in cases where, unless the injury be so great as to be incompatible with life, a process of recovery immediately commences; but how different is it if the organs and tissues are not in a state of integrity, and more especially if the kidneys be diseased; and thus, indeed, surgeons are hardly fair to themselves in attributing death to an operation, when the real cause is rather in the state of the viscera. Referring merely to that common affection, hernia, and the mortality connected with its operation, I may remind you, that several years ago it was shown by Mr. Wilkinson King that strangulation occurred after a certain period of its existence, and at that time when the tissues were undergoing some degeneration and senile changes, and consequently the body was not in a condition which would tend to recovery after an operation; and thus, if a granular kidney and other morbid states be found, we cannot but think that a fatal peritonitis is in part attributable to this as well as to the local lesion. In consequence of the degenerative changes in the kidney being slow, there may not have been any noticeable symptoms of its disease, although predisposing to a serious result, if any untoward circumstance should light up its morbid influence; and thus a diseased kidney is sometimes found to account for the most obscure cases admitted into the hospital; two of such I well remember in the accident ward: one that of a man who received a slight blow on the chest, and yet quickly died in a most unexpected manner; but a pleurisy, excited by the injury and predisposed by a small granular kidney, sufficiently cleared up the case after death: the other was that of a man who was received on account of his having fallen off a ladder, only a slight distance from the ground, and, no injury being discernible, his death in a few days, with comatose symptoms, sufficiently accounted for the surgeon's anxiety to know if the head had been injured; but the necropsy showed no injury whatever, but a greatly degenerated kidney, whereby it was clear that the fall was merely caused by the oppression which was slowly stealing over the brain, and which ended in coma.

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[1] See a paper by Dr. Chevers in the *G. Hosp. Rep.*, series ii. vol. i.

Stricture and *enlarged prostate* cause death generally by suppuration of the kidneys: the bladder being long inflamed, the ureters become affected, afterwards the pelvis of the kidney, and then the tissue of the organ itself suppurates; thus is produced the surgical kidney, of which I have already spoken, in distinction to the primary affection, or Bright's disease; in some cases, though these are the exceptional ones, a general pyæmia may be set up, and thus lobular abscesses are found in the lungs. Death may occur immediately from the stricture, owing to extravasation, and this may be either external or internal, producing a pelvic cellulitis; I have already spoken of the frequency of the latter. In examining a strictured urethra, you should always open it on the upper surface, for by so doing you leave untouched the under surface, which may be the seat of false passages, or various operative measures which have been practised upon it.

Enlarged prostate is fatal by causing retention of urine, cystitis, and suppuration of the kidneys; and in this affection, as well as stricture, we frequently find the ureters dilated, as well as great distention of the pelves of the kidneys.

Calculus Vesicæ and Lithotomy.—If a stone be not removed from the bladder, it sets up inflammation and a secondary suppuration of the kidneys, and combined with this is a dilatation of the ureter and pelvis. After lithotomy, death arises in children generally as a direct result from the operation; in the adult the same may occur, but the greater mortality is due to the diseased state of the urinary organs at the time of the operation; the kidneys, in a very protracted case, being dilated into a mere shell, and the tissue degenerating. If death arise immediately from the operation—which, however, is not now-a-days at all frequent—it is from some infiltration into the cellular tissue around the wound, and so into the coats of the bladder, and a subsequent peritonitis; sometimes a patient has died from a general pyæmia, but this is not common.

There are still a few diseases left which do not have their seat in any special organ, or at least are not yet proved to have any one local origin; some of which are, therefore, called ***essential diseases;*** these I shall describe separately.

Pyæmia.—I have already, in speaking of the several organs, mentioned inflammations and abscess arising from an absorption of a putrid or purulent matter into the blood; and the theory formerly was, that the pus was carried into the circulation, and deposited in the internal parts of the body; this, however, is clearly incorrect, for, previous to the existence of pus in any organ, the inflammatory conditions preceding this product may be traced, and thus all that is now believed is, that some of the elements of pus or decomposing materials taken into the blood may produce those conditions which lead to suppuration. It was thought too, formerly, that pus, or its elements, could only get into a vein if that vein was inflamed, and thus the disease of which I am speaking was styled *phlebitis;* as, however, we know that this is not necessary, we adopt the preferable term *pyæmia,* which implies merely an introduction of pus into the blood, or some similar matter. Experiments show, that where pus is taken into the vein, it causes a coagulation of the contents, and so an obstruction to the further passage of the extraneous matter; and therefore, if now an inflammation is set up, the phlebitis must be regarded rather as a conservative than a morbid process. You know I have often shown you a phlebitis and obstruction of veins, especially in the pelvis, without any contamination of the whole mass of blood; if, however, this should not occur, and the purulent elements be carried into the smaller vessels or capillaries, then a stagnation of blood takes place, and thus it is, as I have already said under the subject Lungs, that the first appearance witnessed is a lobular congestion, or a number of red spots or ecchymoses throughout the organs; subsequently an inflammatory product is thrown out, a hepatization takes place, and very rapidly an abscess, with probably a sloughing of the tissue; the red congested margin of these local suppurations should be particularly noticed. In the majority of cases of pyæmia you will find the lungs only are affected; and the reason for this may be twofold: first, that as soon as the right side of the heart has received the vitiated blood, it sends it to the lungs, where the first set of capillary vessels exist in which a stagnation can occur; and, secondly, that there appears to be some close affinity between the lung and the morbid products in the blood, whereby these organs become involved in the attempt to get rid of them. In the exceptional cases, other organs are affected, as the liver or spleen, and then we suppose that some of the morbid matter must have been carried through the lungs into the arterial system, and so all parts become liable to contamination; I have seen, however, a few cases (which show that the subject is still open for further investigation), where the liver appeared more affected than the lung, or even solely affected; in some such cases however, where severe injuries have been received, another source for the absorption of the poisonous matter may sometimes be found in the abdomen, whereby the portal blood has become contaminated. In more rare cases, all parts of the body may become affected, and thus I have more than once seen purulent deposits in all the above-named organs, and also in brain, kidneys, heart, &c. You will observe that the immediate cause of death is often a serous inflammation; but I do not think, as some suppose, that this is produced immediately by the infected blood, but by the bursting of an abscess in the adjacent organ; and thus pleurisy arises from abscess in the lung, peritonitis from the rupture of a suppurating liver, and a pericarditis, sometimes happens, from the breaking of an abscess in the substance of the heart: the first part affected being the capillary structure of a parenchymatous or solid organ. Occasionally, cases are fatal within a very short period after the onset of symptoms, and nothing is found; then the local congestion of the lungs, and the purpuric spots on the surface, are of great value in coming to a conclusion as to the nature of the case; I have already alluded to this subject under Lungs. Besides these internal suppurations, you may also find abscesses on the surface of the body, and in the joints; but as a rule the two are separate; and you may, indeed, advantageously divide pyæmia into two forms: the one acute, where the lungs become very rapidly affected; and the chronic, where abscesses form on the exterior of the body; it is the latter form of case which you see recover after protracted illness, while the former seldom is cured; the one, however, sometimes terminates in the other. There are particular sorts of wounds and injuries which favor the absorption of matters into the blood, and, above all, those where the bone is exposed; thus, after amputation and injuries to any part of the skeleton, they are most common; Mr. Bryant informs me, that half of the deaths from amputation arise from pyæmia, and my own experience confirms this; while in cases of lithotomy, excision of breast, hernia, &c., it is quite the exception; the most common cause after that I have named is an abscess in one of the limbs; it would thus appear as if the bone was a favoring cause for the absorption of putrid elements into the blood; and we can see how much more readily this could occur through the Haversian canals of the bone, than through a contractile vein. It remains, however, a question whether the putrid elements are conveyed through the medulla rather than by the solid or cancellous structure of bone; and in relation to this matter, whether pyæmia is less frequent after excision of a joint than after amputation.

It is an old belief that abscess in the liver is more likely to occur after injuries to the cranium; but I cannot say that it is correct; but showing how a source of contamination may be overlooked, in a late case of pyæmia it was only after a long search that we discovered caries of the skull, and subsequently that the cause was a severe blow. Rarely a wound is healing when pyæmia occurs, but far more usually a sloughing process is going on; I have already said, that when a patient is much exhausted, death may so rapidly occur that no abscess may be found internally; in such a case, if we find no organic disease, but purpuric spots denoting a vitiated condition of the blood, and a sloughing wound, together with a yellow tinge of the skin and a sunken eye, we may, if certain symptoms have existed during life, safely conclude that death has arisen in the first stage of pyæmia. The symptoms are shortly these, and very characteristic. If you have a patient suffering with a wound, and that be sloughy, and especially if the bone be exposed, and the patient should be suddenly seized with rigors, and should fall into a febrile condition, with great prostration, anxiety, and tongue be red and brown (or in a state resembling that of typhoid fever), and skin assume a dingy or yellow hue, you may be pretty certain that your patient has pyæmia; to these symptoms some add a peculiar odor of the breath. If a patient should die rapidly in this manner, and yet nothing more be found than the purpuric condition of lungs, I should call such a case one of pyæmia, fatal before it had evidenced itself in local inflammations.

Puerperal Fever.—This is a disease you are sure to be some day acquainted with; it is the general name given to many fatal affections following labor. Opinions still vary as to its nature, whether, indeed, it be only a pyæmia such as I have just described, the interior of the uterus corresponding to the stump of the amputated leg, or whether it be not an essential disease, a kind of puerperal typhus. All are agreed that it is a blood disease, but not whether the fluids be infected by an absorption of putrid matters from the womb, or the disease be induced by an infection of some more subtle character, as through the atmosphere. The latter theory is strongly advocated by some, because very often no local disease is found in the body; and even should there be any, it is argued that it may be looked upon as secondary in the same way as the pneumonia of fever: moreover, the fact of the highly infectious nature of the complaint, when a number of lying-in women are placed together, is said to resemble more the conditions of a special disease, and also that it is often much more rapid in its course than a pyæmia is ever known to be. For my own part, I never could see the wide difference between these doctrines, which are still so warmly debated, especially since either could be applied to the general question of pyæmia. In the latter affection, the local sore is in most cases clearly the source of the infection, but at the same time, if a number of patients be crowded together, as was the case in the Crimean military hospitals, then a great mortality occurs, and death is so rapid that no local lesions occur, or, at least, are discernible. I have already alluded to this class of cases, and shown that they are clearly pyæmic, although so rapidly fatal. I think there can be no doubt that an unhealthy state of the surface of the womb will lead to the affection, and this is supposed by many to be induced by portions of placenta being left, or the entrance of air into the cavity; since we know air generally causes decomposition in other parts. On the other hand, the fact of the medical attendant conveying the poisonous influence to his patient, is regarded as a proof of atmospheric infection, but even in this case its place of entrance may be the uterus itself. I think one reason why opinions have so varied is, that pyæmia was formerly supposed to be a phlebitis, and the latter condition is so rarely met with in puerperal fever. In whatever way, however, the disease is produced, it is looked upon by all as one in which the blood has been affected by a poison, and the post-mortem appearances do not differ, I think, much from those of pyæmia, only that rapidly fatal cases are much more common. In instances where life has been prolonged several days, you may find lobular abscesses in the lungs, or even, as I have seen, local inflammations of the liver or acute peritonitis; in one case there were vesicles of pemphigus all over the body.

The appearance of the body at once suggests a blood disease, by the rapid decomposition and staining of the integument in the course of the superficial veins. Within, the blood is fluid, and all the vessels and tissues are redened by the hæmatine; in some of the pelvic veins you may sometimes find soft coagula, but as a rule, and according to my own experience, no clots are usually discovered. I mention this, because I have already alluded to sudden death occurring in puerperal women from plugging of the pulmonary artery, and it might be thought that coagula were likely to occur in such cases; but I should say the opposite is the fact, remembering that this does not militate against the idea of a purulent matter from the uterus entering a vein and so causing a coagulation, a part of which may be carried away. Besides this fluidity of the blood, the organs are all soft, especially the uterus and ovaries, which are often quite pulpy and readily broken down; a dirty greenish fluid also exudes from them, and sometimes the lymphatics passing along the broad ligament to the ovary (a fact especially insisted on, I think, by Cruveilhier) are seen affected. A case which I examined lately I will briefly relate, as it affords an ordinary example of what you find, or, as some of you might think, how little you do find. It was the case of a young woman who died two or three days after labor. The body was scarcely cold, but already livid marks of decomposition were commencing to be seen; rigor mortis was not perfect: the appearance was that of a woman who had died in perfect health, robust, and abundance of fat both within and without, but the skin had a slight dusky tinge. The lungs had numerous purpuric spots on the surface, indicative of a blood disease, and within, numerous lobules were highly congested, and presented exactly that appearance which precedes the lobular pneumonia. The heart was flabby, and all its cavities contained dark fluid blood, or only the smallest loose coagulum on the right side, and the endocardium was already stained of a pink color; the vena cava was also filled with fluid blood, and similarly stained. The intestines were much distended. The liver had numerous red spots on the surface and interior, and no doubt, had the patient lived, these would have been followed by local inflammation and abscess. The spleen and remaining organs were very soft. The uterus was very soft, so that the thumb could be thrust through its walls; its inner surface was covered by a greenish-brown pulp, and this could be scraped off in large quantities, leaving the muscular tissue beneath bare; when squeezed, a dirty fluid oozed from the veins. The ovaries were large, soft, and easily broken down, one containing some coagulum; the ovarian veins distended with dark blood, which flowed out when they were cut; the iliac veins also full of fluid blood. The principal appearances you see were the softness of the organs, especially the uterus; the fluid condition of the blood, with the purpuric effusions in various parts. In a case we examined here a short time ago, where death occurred a fortnight after labor, acute peritonitis existed; and the uterine walls, especially near the cervix, exuded a purulent matter when squeezed; the ovaries were also in a state of suppuration. One of the results of labor is a pelvic cellulitis or inflammation, and suppuration around the organs in the pelvis, and which often continues for many months before recovery takes place, and sometimes terminating by the bursting of abscesses externally or into neighbouring organs; this is one of the local effects of parturition, and begins generally in the ovary, but whether altogether distinct from puerperal fever, or only a preliminary stage of the same affection which fortunately terminates locally, is not altogether decided.

TYPHUS FEVER.—In this disease we find no special morbid condition of any particular organ, though all parts of the body show evidence of an unhealthy state in the softness of the tissues. The heart is flabby, the liver and the spleen are soft, and the latter is also enlarged; the blood is fluid, both in the vessels and the heart, except perhaps a small loose coagulum on the right side. The lungs show evidence of a blood disease, by the purpuric spots on the surface, and are also highly congested at their posterior parts; this congestion, in some cases, passing into a pneumonia, though this is not so common as in typhoid. The brain, although suffering so much during life, is generally healthy, excepting in those cases where the blood is much diseased, when it may be found in a purpuric condition. The surface of the body is very often covered with petechiæ, which were also present during life as the last stage of the mulberry rash. In some cases a general exudation has taken place from the surface of the intestinal canal, and this is consequently found full of blood.

TYPHOID FEVER.—In this disease, unlike typhus, several local changes are met with, especially in the lower end of the *small intestines;* here are found the peculiar deposits in Peyer's patches, as already described, and presenting various appearances, according to the stage of the fever; the mesenteric glands are also enlarged and soft. The condition of the *lungs* is not generally regarded as an essential part of the disease, but as a consequence of the morbid state of the blood and tissues; they are found spotted or ecchymosed on the surface, and when cut, the interior shows the lobules highly congested, or many of them even in a state of pneumonia; or, which is not unfrequently the case, the whole back of the lung consolidated by recent inflammation; this, however, is not uniform, but presents numerous lobules in a later stage of disease than the more recently hepatized tissue. The *bronchial* glands are also somewhat enlarged; but I think this is not characteristic: I have only seen ulceration of the *larynx* once. The *spleen* is twice or thrice its natural size, and softer than in health. The *heart* presents no remarkable appearance, not being particularly soft, and generally contains coagula, though these are not so large or firm as are ordinarily found in most cases examined after death. *Kidneys* rather large but healthy, and *liver* healthy. *Brain* healthy, except in those exceptional cases where there is a disposition to purpura, when spots of blood, or small effusions, may be found in various parts of the structure. All the organs are rather soft, but not in so marked a manner as in typhus. The body presents no petechial rash, as in typhus, but the limbs may be found livid, or covered with small purpuric spots. A very common cause of fatal termination is a perforation of the intestine, and a general peritonitis: owing to the sloughing of one of Peyer's patches, a perforation occurs, and allows fœcal matter to escape; sometimes, after the adventitious matter sloughs out, the peritoneal coat remains of so thin a texture that some exudation occurs through it, and a peritonitis may be set up without any actual perforation. In such cases a local peritonitis may occur, and recovery take place; or, as I have seen in one instance, a local peritoneal abscess, which terminated in death several months afterwards.

PURPURA.—As a symptom, purpura may be found accompanying various general and local disorders, such as fevers and the exanthemata, as well as diseases of the liver, spleen, &c. In the absence of any such causes, we are obliged to look upon the affection as a specific one, and style it purpura. This, however, is not common, but occasionally occurs, and sometimes is a disorder which is fatal in a few days. As during life the whole body is covered with spots, and hæmorrhage occurs from every opening on the surface, so after death all the tissues of the body are bathed in blood, and it is found bursting forth from all parts of them. The serous and mucous surfaces are found covered with extravasated blood, also the bladder and kidneys, and in most cases also the brain; the exudation of blood into the brain is often the immediate cause of death by interfering with important parts of the organ; in other cases death is caused by exudation of blood into the lungs, or simply by exhaustion; in some cases the spleen is found inordinately large, as well as its corpuscles.

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There are other affections which also may cause death by anemia; such as the peculiar enlargement of the lymphatic glands, to which I have already alluded. In this affection, where the whole glands are enormously enlarged, there is generally also some corresponding enlargement and deposit in the spleen, and perhaps also a similar though less affection of liver and kidneys. In such cases the essential disease is no doubt in the lymphatics, which being destroyed in function, a general dropsy and anemia ensues.

Allied to this is a *lardaceous* affection of all the organs, especially liver, spleen, and kidneys, and which also kills by a general derangement of the system, or sometimes by the implication of some particular organ.

Approaching this again is a general *tuberculosis* of all the viscera, which kills generally by the implication of such important organs as the brain or lungs.

These diseases are allied to one another, since they are frequently found associated.

LEUCOCYTHEMIA.—This term has been applied by some to the affections just named; but I have myself never witnessed the condition of blood implied by it in other cases than those of enlargement of the spleen. Of these I have now seen several, characterized during life by extreme prostration, and often purpura or severe hæmorrhage, the blood showing the white corpuscles as numerous as the red; and after death no disease, except enlargement of the spleen, or of a few lymphatic glands.

DIABETES.—The body is wasted, and the cause of death is generally found in the lungs, but hitherto no local change in explanation of the cause of the malady has been discovered. The brain is healthy, and since the discovery of artificial diabetes by wounding the floor of the fourth ventricle, this part has been especially examined, but not found in any way appreciably altered. The liver too, which no doubt has been deranged either primarily or secondarily, generally presents a uniform fleshy appearance, but no marked structural changes are discoverable in it; the kidneys are large, indicative of the increased work they have had to perform; the stomach appears healthy, as well as the intestines, which are usually filled with hard scybala. As regards the lungs, sometimes death has taken place rapidly by a pneumonia, and this I have seen in one case end in gangrene; generally the affection is chronic, the lungs being disorganized and occupied by vomicæ, and usually styled phthisis, as it does not differ from many examples which receive this name, although no tubercles are present. I have seen death occur suddenly without the presence of any appreciable organic disease.

Cholera.—Four years ago I examined many bodies of those who had died of cholera, and the following were the appearances :—As a rule, the viscera showed no signs of organic disease, although repeatedly I found old standing morbid conditions, as ulcerated intestines and degenerated kidneys; but it has not yet been ascertained what is the proportion of diseased to healthy persons who suffer from this malady. In rapidly fatal cases, the skin is often livid, and the temperature high, rigor mortis present as in other bodies. The lungs are congested, and the posterior parts approaching a state of inflammation; the heart contains clots as in other cases, and these are firm and sometimes decolorized. The pitchy condition of the blood, I imagine, is spoken of by those who have attempted to bleed their patients during life, and is a state they theoretically consider ought to exist after the loss of so much saline fluid; the heart however, so far as I have observed, contains generally well-formed fibrinous clots. The gall-bladder is distended with bile, and the liver itself appears healthy. The appearance of the alimentary canal is peculiar, and almost characteristic of the disease; the intestines lie coiled up in a very small space; instead of being full of air, and having a disposition to uncoil or separate themselves, they lie in a compact mass, as seen on opening the abdomen of some of the lower animals, and as if they had lost their elasticity; they are contracted, and feel doughy to the touch, and can be moulded into any form; their color, as they lie in the abdomen, is peculiar, the peritoneum being of a rosy pink hue, and from its surface exudes a tenacious mucoid secretion: this latter condition is not generally described, but this may be owing to its not being always present; it is not, however, uncommon, and may be best observed by separating two coils of the bowel, when a viscid mucoid string is formed between them. The secretion is hardly like that of recent inflammation, as the exudation is more like mucus, and is more sticky than the greasy sero-albuminous fluid of ordinary inflammation. The however, accounted for all classes of cases, and there can be no doubt that the brain itself may be affected by the deposit of a similar material of which I have been speaking, though it is very probable that it is generally the surface only which is involved, and that the matter will be found on the surface of brain, and between it and the membranes. As regards nerves, it has clearly been made out in many cases that *tumors* or neuromas have been due to syphilis. The *arteries*, too, are in all probability, susceptible of the same influence, that is, that a deposit, atheromatous or of an analogous kind, forms within the coats, leading to various consequences; and thus, in some cases of aneurism and softening of brain from diseased vessels, syphilis has been the most probable cause.

In the fœtus the same deposits may be found: I have myself seen peritonitis and pneumonia; and Diettrich, who first observed the deposits in the liver, speaks also of a peculiar induration of the whole structure of this organ.

I have said that the matter which is effused is but little organizable, and consists of some nuclei and fibre, as well as a translucent amorphous substance; the latter appears the same, or very similar to lardaceous material, and thus it is not surprising if sometimes, instead of local firm deposits, a more general diffusion of this substance should pervade all the organs; and so it is that in persons dying from syphilitic cachexia, as we not long ago saw in a young woman, the liver, spleen, and kidneys, are filled with this peculiar substance: in parts of the liver this was commencing also to fibrillate. It is remarkable, too, that as many of the morbid conditions attributed to syphilis resemble those produced by mercury, so after death similar resemblances should be met with; and thus, in one of the oldest specimens of lardaceous liver in our museum, which Dr. Hodgkin describes as having the appearance of a ham, the only apparent cause for the affection was a long course of mercury.

TUMORS, NEW GROWTHS, AND ADVENTITIOUS DEPOSITS.

These terms apply to different physical and pathological conditions, but yet can scarcely be separated from one another; a tumor denotes any swelling, though it is generally intended to apply merely to formations of new tissue, and hence the more recent appellation, new growth; while, if this new material be diffused through an organ, the term is no longer applicable, and some epithet denoting the change or degeneration of the structure is adopted instead; it must be remembered, however, that it is not always easy to draw a line between these, and that cancer, tubercle, fat, fibrous tissue, &c., may be diffused and isolated in the same case. I will write you a list of the commonest of these new products and materials, and then endeavour, in a few words, to give you some general idea of their nature, and their true relation to one another:— Cancer, malignant and recurrent fibroid, fibro-plastic, fibro-nucleated, fibro-cellular, simple fibrous, muscular or uterine and prostatic tumors, enchondroma, exostosis, osteo-sarcoma, osteoid cancer, myeloid, glandular tumors, adenocele, cysts, cysto-sarcoma, &c., epithelioma, melanosis, colloid, villous cancer, fat, sebaceous tumors, vascular tumors, tubercle, lardaceous, fibroid, and inflammatory deposits.

All these terms I have already employed, and many others I might name which are coming into use, but I will not impose too much on your memories. These varieties do not so much contain in themselves peculiarities, as they differ according to the circumstances of their growth, and therefore the great object of the pathologist is to discover what interpretation to put upon the various forms, to discover what are the essential ingredients, what the secondary, or how much they are dependent upon a constitutional and how much upon a purely local cause. In the first place, all such adventitious products are morbid; for, while the organism is healthy, all the nutrient fluids of the body are employed in maintaining the integrity of the tissues, which, however complex they may be, are constantly being renewed; let, however, there be any injury to a part by which a breach of surface occurs, a plasma is thrown out to heal it; but then the affinity is in great measure lost between this fluid and the original structure, for, although the disposition still remains to repair the breach by producing a material like that from which the blastema has issued, yet this can only be accomplished within certain limits; thus visceral tissue is not reproduced, or muscle or nerve, except under exceptional circumstances in young persons. When, then, a blastema proceeds from any part, whether the cause be purely a local one from injury, or have altogether a constitutional origin, its tendency in the soft tissues is merely to develop into the most elementary forms; but even within these narrow limits the greater the tendency to develop, and not to remain as a simple structure, the nearer the approximation to a healthy state, and the more innocent the character of the growth. Thus in most of the softer structures of the body the main constituents of adventitious deposits are cells and fibres of various forms and combinations: the purely cell structure being analogous to cancer, and malignant; while the fibrous shows a tendency less malignant. You will remember, then, that the majority of new growths are of this simple character, having, however, bloodvessels of their own in most instances.

Supposing now that, owing to some morbid condition of a part, a blastema or plasma is thrown out which shall fibrillate, a *simple fibrous tumor* is produced; in this, however, nuclei may be found, and thus various combinations of simple fibre and nucleated fibre may exist together. Of this kind are fibrous polypi, wens, various cutaneous hypertrophies, &c. A looser fibro-cellular growth is seen in nasal polypi.

Now, suppose again this plasma should form nuclei and cells, and these should rapidly be produced and have no tendency to fibrillate, a large mass of useless structure is seen which can receive no other name than cancer. These cells, I believe, are not peculiar, but are simply embryonic cells, which are constantly being produced without any object, and therefore display a vicious or malignant condition of system. I do not think that they can be distinguished from many healthy secreting cells, and that the microscope is insufficient to declare their nature from simple inspection; but the fact of a tumor being composed of these rapidly growing elements is sufficient to indicate its malignity.

Now, for a third time, suppose an intermediate condition: a plasma which forms cells having a disposition to change into fibre; a tumor is produced, which is seen to be composed of rapidly growing nucleated fibres. It was an examination of such tumors by the microscope that threw discredit on the instrument when it first came into use, for it could only give a doubtful answer about them; this, however, showed that growths were being examined which were intermediate between cancer and innocent tumors, and were, in fact, semi-malignant. They are styled recurrent or malignant fibroid.

These you may regard as the three great divisions of tumors—

innocent, malignant, and semi-malignant; but they pass into one another, and various grades of them, no doubt, exist. Thus cancer, or the cell growth, for instance, is divided into scirrhous and medullary: the former being hard, and the latter soft, or resembling a piece of brain, whence its name, encephaloid—being a vascular soft structure, giving out a milky juice when squeezed. These two forms do exist, but, at the same time, the hardness or softness of a cancer depends very much upon the texture of the organ in which the adventitious deposit takes place, and thus the hard cancer of the breast is more dependent on the natural fibrous texture of the gland than upon any hardness inherent in itself. The most rapidly growing cancer is the *medullary*, and this, when of the acute form, is soft, and often contains nothing more than nuclei: nuclei being formed probably before cells. If, on taking a portion of soft cancer, you find a cell-wall forming around the nuclei, I think it shows that they are of less rapid growth than when found quite free; and if the cells can be completely separated, it indicates that the tumor has been produced still more slowly, and exhibits a less degree of malignancy in the system. These cells are held together by a delicate amorphous framework formed from the plasma, and also by a series of bloodvessels of new formation. If the cells should have a tendency to sprout out, and if the plasma fibrillates into a firm matrix, the tumor is necessarily harder, and a *scirrhous* cancer is produced; this is of slower formation and less malignant than the medullary.

The fibrous and fibro-nucleated tumors, as before mentioned, are innocent, but the *recurrent* fibroid are of a semi-malignant character. They were formerly classed with the cancers, but they are found merely to recur at the same spot after removal, unless, indeed, they have existed for a long time, when they may be propagated throughout the body like a cancer, and are therefore sometimes styled malignant fibroid. In appearance they resemble somewhat the cancers, but are firmer, and give out only a serous instead of a milky juice, have a fibrous structure when torn, and display nucleated fibre by the microscope. You can easily imagine how such a tumor should approach the more innocent in some instances, and thus even other intermediate varieties be formed. Thus there is one which is called *gelatinous sarcoma*, or *collonema*, and which sometimes returns after removal; it is composed of the most delicate fibres, formed from sprouting cells, and its general appearance

SCIENTIFIC CLASSIFICATION OF NEW GROWTHS AND ADVENTITIOUS PRODUCTS.

CHARACTER.	*Ordinary Structure.*	*Uterus and Prostate.*	*Mamma.*	*Bone.*	*Epithelial Surface.*	*Hollow Organs.*	*Pigment.*	*Vessels.*
INNOCENT	Simple fibrous	Muscular	Adenocele .	Exostosis, Enchondroma, Myeloid	Warts or Papilloma	Villous Disease	Melanosis .	Teleangiectasis.
SEMI-MALIGNANT	Fibro-plastic or recurrent fibroid	. . . .	. . . .	Osteo-sarcoma . .	Epithelioma	Ditto	Ditto	Ditto
MALIGNANT . . .	Cancer, Scirrhous, Medullary	. . . .	. . . .	Osteoid Cancer . .		Ditto	Ditto	Ditto
	(Colloid, simple or combined with Cancer.)							

is semi-translucent and very firm, and emitting merely a serous juice on pressure.

I take these three forms of tumors as the types upon which all others are formed: the innocent and the malignant at the two ends, and semi-malignant between them. All other tumors, I think, owe their character to a local cause which modifies their growth; and if this be true, you will have no difficulty in understanding the nature of the long list of names before you, and which I know are apt to puzzle students. I will now refer you to this table, and you will perceive that I place all other growths side by side with those already mentioned, believing they are due to the same causes, but modified by circumstances. These modifying circumstances, however, as I just now told you, exist only to a very limited extent, and in connection only with the simplest structures: as bone, uterine fibre, mammary gland tissue, &c. You must remember, too, that although I say the ordinary growths which I have described have characters added to them by a local cause, yet that their nature remains, and these secondary qualities are propagated through the body if the foundation be of a malignant type.

The first structure on the list which modifies these growths is the *Uterus;* and this you might almost expect, when you remember how closely allied is the tissue of this organ to simple fibre. The consequence is, that the so-called fibrous tumors of the uterus are of the same character as that composing the structure of the organ itself, and are consequently muscular tumors. As it is only during the rapid increase of size of the uterus that these fibres are well developed, so it is only in the case of a tumor which has grown during gestation that the well-formed muscular bands are seen. Besides this innocent growth, cancer and recurrent fibroid may arise in the uterus as elsewhere.

The tumors of the *prostate*, and the so-called third lobe, are composed of the same structure as the gland itself—that is, unstriped muscle.

The next organ on the list is the *breast*. This organ may be subject to cancer and recurrent fibroid disease, as in other parts; but let the same causes be in operation which should produce an innocent tumor elsewhere, an adenocele is formed—that is, there being no vice or cancerous disposition in the system, the plasma has a tendency to produce a normal structure, and consequently, from being in the neighbourhood of the breast, mammary tissue is formed.

We come next to *bone*, where we see remarkably how its presence does not so much alter the character of the growths, *quoad* their innocency or malignancy, as it modifies their outward features, which are preserved in any part of the body to which they may be propagated. We may have here, as elsewhere, the three forms of tumor in their simplicity, as already described; the more innocent however are rare, as they are readily altered in character; but a cancer may attack a bone and destroy it, as in any other part—that is, a soft cancer; for the harder and less malignant are apt to be changed. Now, in what does this change depend? As you might expect—into bone, or into those substances out of which bone is formed; and therefore you might anticipate that the same causes which would produce soft tumors elsewhere, would, when operating near bone, produce osseous tissue, or those substances which are so intimately related to it, as cartilage or myeloid matter; as, however, the latter constitutes the marrow, this only can form when the morbific cause is in the centre of the bone. Let, then, the agency which produces a simple innocent tumor elsewhere, be at work near a bone, and the result is an EXOSTOSIS or an ENCHONDROMA, or the two combined: an out-growth of an innocent character. Should the agency be exerted in the middle of the bone, we then see a substance produced which had a natural existence in the fœtal state, and this growing from a centre, forms at last a large round MYELOID tumor at the end of the bone. Now, again, suppose there should be a disposition to form a semi-malignant fibro-plastic or fibrous tumor near a bone, this tumor will still preserve its definite boundaries and other characters as heretofore, but the fibre become ossified, and an *osteo-sarcoma* is the result; at the same time it is probable that some cartilage may be produced, and thus varying proportions of bone, fibre, and cartilage, may be found in these growths. If these tumors be propagated through the body, and infect the internal parts, all the elements are again reproduced, but the softer structure corresponding to the recurrent fibroid is often well marked. Once more—suppose a scirrhous cancer attacks a bone and the matrix become ossified, an *osteoid cancer* is produced, which, although bony in structure, destroys the natural tissues in the same way as cancer, as in the case I showed you where the inguinal glands were enlarged by bone, and the lungs also contained this substance. You can see also, how, in some other cases where the whole bone is involved in a cancer, that a simple cell element, osseous matter, and myeloid, should all be combined, as occurred in a case not long ago, and where the same constituents were propagated through the body.

If we pass now to *skin*, we may observe the same growths affecting it; the simple fibrous, however, has a tendency to run over a large surface, and we have thus condylomata and other similar tumors formed. Should the morbific cause affect the epithelial surface of skin or mucous membrane, then a modification takes place. Should the disposition be cancerous, then a mass of cells is formed which resemble more or less the natural epithelium of the part; and if the disease be propagated to neighbouring organs—which, however, is rarely the case—still the epithelial character remains: the peculiar grouping together of these cells into capsules I have before described. Should the epithelium, in its abundant production over the papillæ of the skin, form a warty mass, this character is superadded to the epithelioma; but a warty growth may be innocent, and composed of simple healthy epithelium. You can understand how, when the skin is affected, the sebaceous follicles are liable also to disease, and thus, by a morbid production of cells, a tumor is formed within them; also, if the subcutaneous fat should be affected, how a steatoma is produced.

Villous disease is dependent, I think, merely on a local cause; and, although pathologists are still disagreed whether it be an innocent or cancerous affection, I think it may be regarded with more propriety as a mere accidental character appended to both. Thus, a simple local growth in the bladder or intestine, may be villous, and yet a cancer may put on the same appearance. This is due merely to the extension of a growth into a hollow cavity, or one containing fluid; and the proof is seen in the case of pericarditis, where, if effusion of fluid be present as well as lymph, the latter will project into the interior as a number of long shaggy processes, like the villous growths I am describing; these, under the microscope, very much resemble the villi of the chorion.

If a growth should spring up in a spot where *pigment* exists, a coloring matter or pigment is added to it, and thus the various forms of tumors already mentioned may be of the melanotic character. I would not absolutely say that the latter is always an accidental circumstance, but in all the last few examples which I have watched, this has been the case; nor would I say that a melanotic tumor is always one of an ordinary kind with the simple addition of pigment, for, although I think that it is generally so, yet sometimes the coloring matter forms the great mass of the adventitious deposit.

As regards *vascular* or *cavernous tissue*, this probably may be associated with growths of various kinds; thus we may find it in its simplicity, as in the liver, already mentioned, and at the same time it may be associated with cancer.

Colloid is a peculiar affection, and about its malignancy or innocency opinions still vary: that is, whether the disease is determined simply by a local cause, or whether there be a constitutional vice influencing its production. Its being almost confined to the peritoneum and the coats of the organs therein contained, would make it appear as if locality was principally instrumental in its production; but again, as it is found also associated with cancer, it would appear as if a general cause could determine its formation. Probably, therefore, colloid in its simplicity is confined to the original seat of its growth, but it may at the same time be associated with cancer. My own opinion is, that the colloid matter is the primary plasma or albuminous matter which is exuded, but remains as such without further development, excepting it may form some simple fibrous network and a few cells.

Besides these isolated deposits which may be called tumors, or new growths, there are various adventitious substances which may be diffused through the various organs or tissues, such as *lardaceous* or *waxy matter, tubercle, fibroid tissue*, &c. As I before said, it is probable that these substances are very nearly related, since they are frequently found associated. Lardaceous matter is a peculiar translucent albuminous matter poured out into the tissues, and, I believe, is one of the simplest and most lowly organized substances which is ever produced in the human body; it is thus met with in tuberculous persons and those suffering from cachexia, infiltrating their various viscera. If there should be a disposition to cell formation, some of these bodies might be formed, but which, shrinking or becoming abortive as soon as produced, a tuberculous mass results. As an evidence of the close alliance of this amorphous lardaceous matter and the abortive cells styled tuberculous, I might merely mention their constant association, and the precedence of one by the other; thus, the gelatinous infiltration in the tuberculous lungs, and the combination of the two in the scrofulous lymphatic glands. If in a third case the albuminous matter should in part fibrillate, we should have the union of these two, as very often seen in lardaceous disease. Sometimes, indeed, nearly the whole matter fibrillates, and then we have the remarkable form of disease sometimes met with, where all the organs and glands contain a diffused deposit of fibroid tissue.

We can further see how the morbid plasma thrown out should in another case produce well-formed cells, when the name cancer must be given; and thus it is easy to perceive how all these affections are related, and how they may pass by insensible degrees into one another.

A very different form of affection appears to be present in the case of pyæmia, where, from some local contamination of the blood, the whole body may in the most rapid manner be occupied by cells, usually styled pus; but even here the difference is one rather of degree than of character, for in the case of the slow formation of deposits, the first cause is often a local one, and which subsequently diffuses itself by the blood through the system. To show really how an acute pyæmia, where the depositions through the body are of the most acute kind, is allied to the instance of a slow growth of tumors throughout the body, I may mention a case which occurred here not long ago, of a woman in whose various organs as well as superficial parts of the body we found soft albumino-fibroid deposits, some of which, particularly those in lung and brain, were softening into a pus-like matter. It was difficult to know whether such a case could with propriety be styled chronic pyæmia, or a disease allied to the malignant fibroid already spoken of. I might mention even other examples, but these will suffice to show you how, by taking a scientific classification of the new growths and various products, their relations to one another become evident.

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